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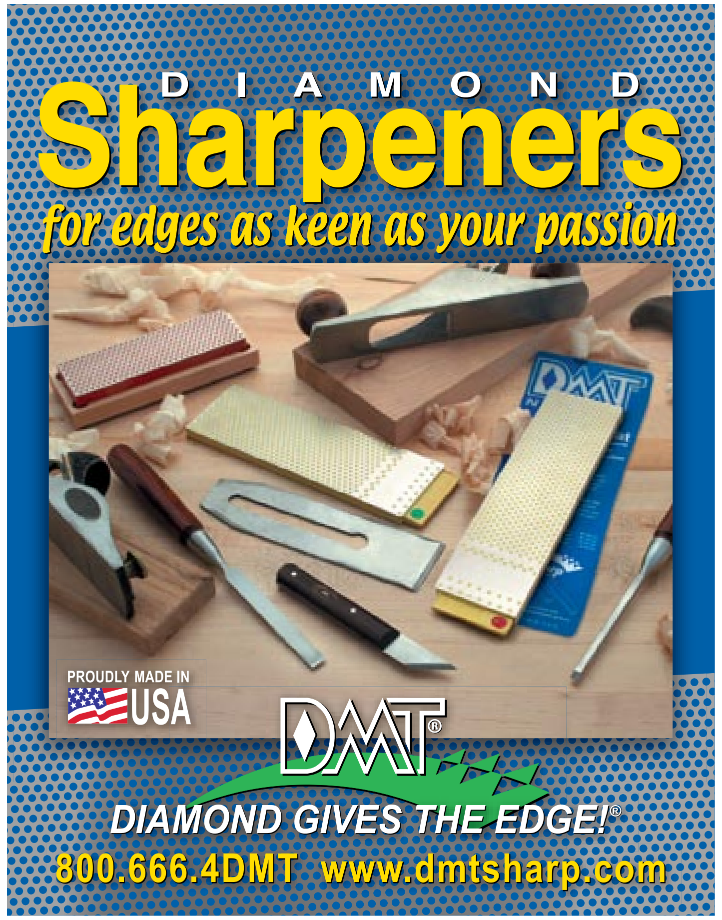
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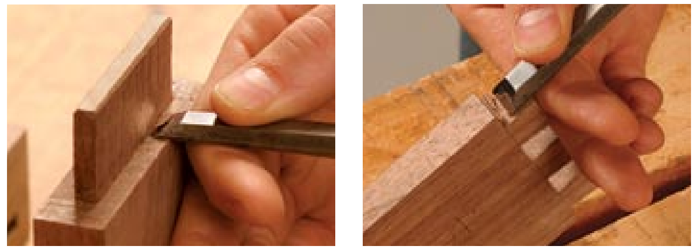

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Cover photo: Andy Engel

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editor's letter

THE SOUL OF WOODWORKING

It's always surprising to visit a shop and see lots of machines but few hand tools in use. I have to wonder how they build anything. I'd be much less efficient without my collection of sharp chisels, or without a handplane to fit doors and drawers to a fine gap.

On the other hand, I understand how frustrating hand tools can be, especially dull ones, which can do damage surprisingly quickly. The trick is to learn to sharpen them effectively, and to understand the critical tune-up steps for each one. These days, with better and better tools available, many tuned and sharp enough to work right out of the box, the pleasure of hand-tool woodworking is even more accessible.

And pleasure is the best reason to try these tools. Nothing in woodworking compares to the feel of a plane smoothing a surface, or the smell of the gossamer shavings floating to the floor. Romantic, maybe, but the tools you use and how you use them are a big factor in how much you enjoy the craft.

I use machines for their brute strength milling wood, and hand tools for the fun stuff: fitting joints, polishing surfaces, smoothing curves, and shaping all sorts of details. Buy a good block plane and try something as simple as cutting a bevel along an edge. You'll appreciate the quietness, the smooth feel of the cutting action, the shine of the bevel as it catches the light, and the way you can easily refine it as you work. And that's just one small use for that plane. Give hand tools a try and you'll discover whole new worlds and ways of working.

— Garrett Hack is a contributing editor.

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- Charles Shackleton ("Refine Your Designs with 3 Carvings") takes you step-by-step through an elegant diamond beading.

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Fine Woodworking

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To contribute an article, give a tip, or ask a question, contact *Fine Woodworking* at the address above or:

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quick tips

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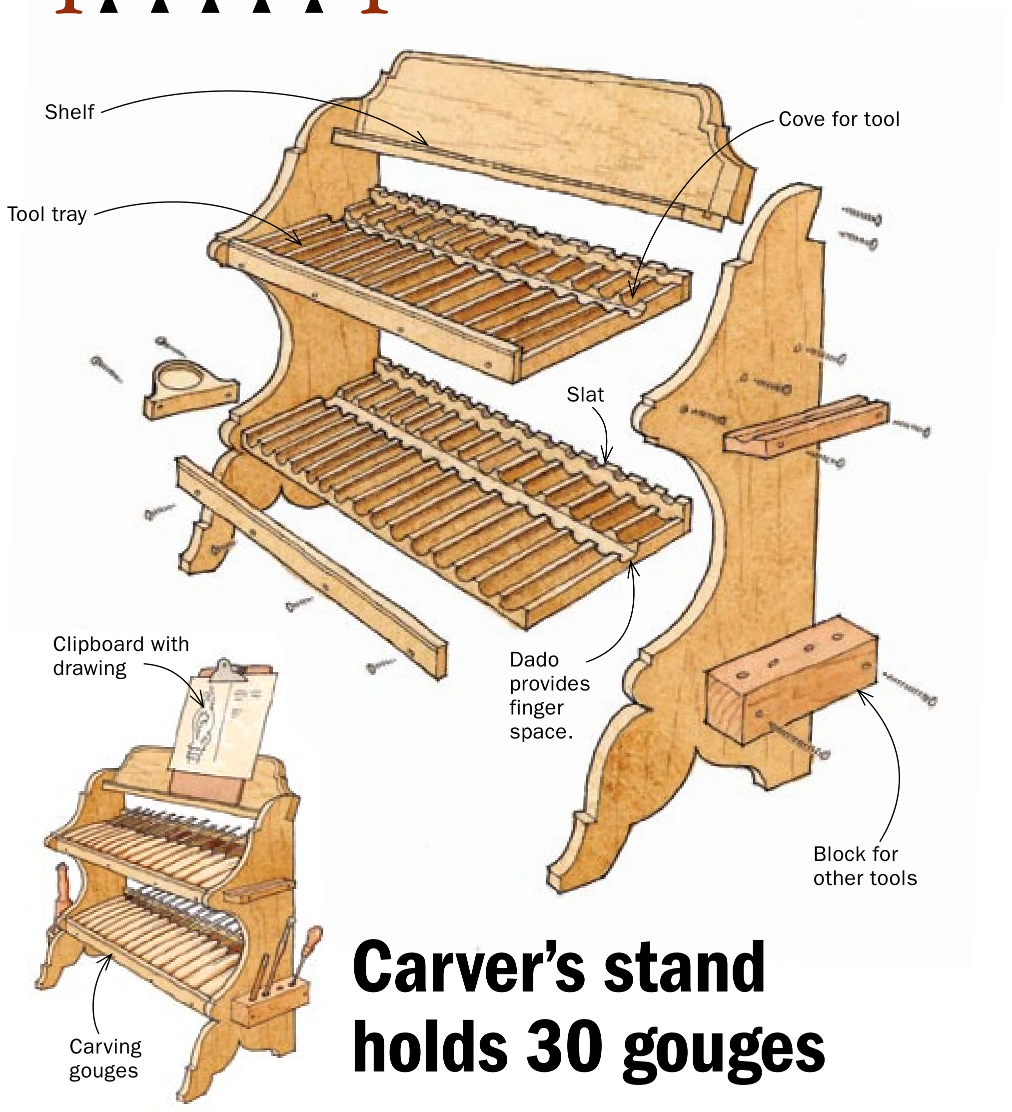

Carver's stand holds 30 gouges

I specialize in making reproduction 18th-century furniture, so it's not unusual for me to use 30 carving gouges on one piece. With that many tools in play, an efficient storage system is a must; otherwise, I'd spend more time looking for tools than using them. This double-decker stand lets me grab the right tool almost from memory.

The design is my impression of what an 18th-century furniture maker might have built. The stand has two sides, two tool trays, and a rack on top to display a sketch of the carving. All the parts are pine. Screws hold everything together.

The tool trays are the heart of the stand. They feature multiple coves, one for each tool. I plowed them with an antique round-bottom plane, but you could either drill 1-in. holes into 2-in.-thick stock and then rip it on the bandsaw, or use a dado blade to cut recesses in 1-in. stock. I also cut a dado the length of the tray about where the tool handles meet the blades. This allows me to grab the neck of each tool easily with my fingers. Each tray also features a slat at the back to elevate each tool slightly. Finally I added blocks, hooks, and holders to the sides to accept a pencil, an awl, a mallet, and other tools I use when carving.

So that I can efficiently pull and replace gouges, I use a logical tool marking and placement system. First I mark each handle with the radius number and blade width in millimeters. Then I place them in order by radius and width, making it easy to find and replace them.

—EUGENE LANDON, Montoursville, Pa.

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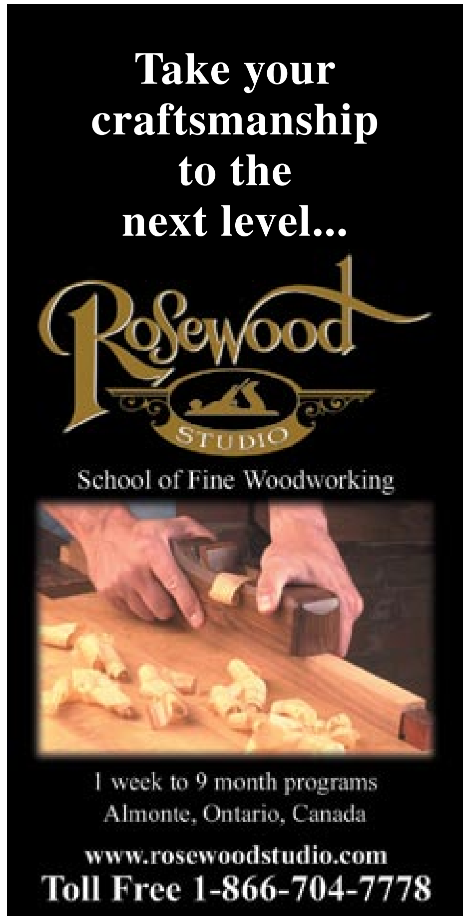

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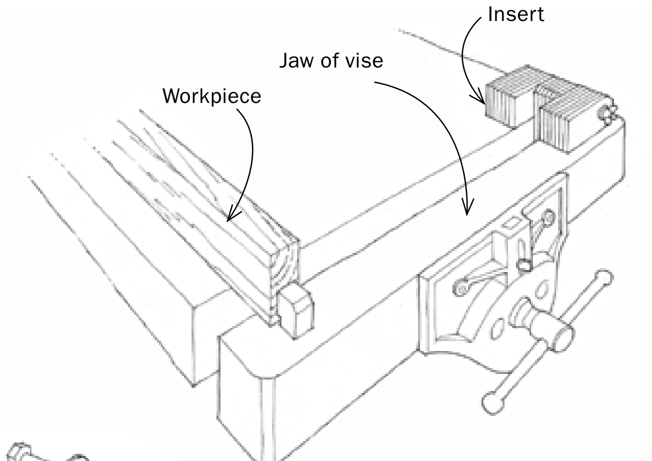
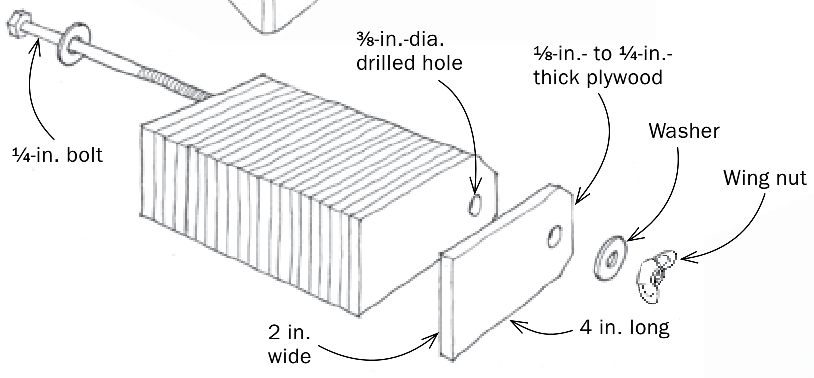
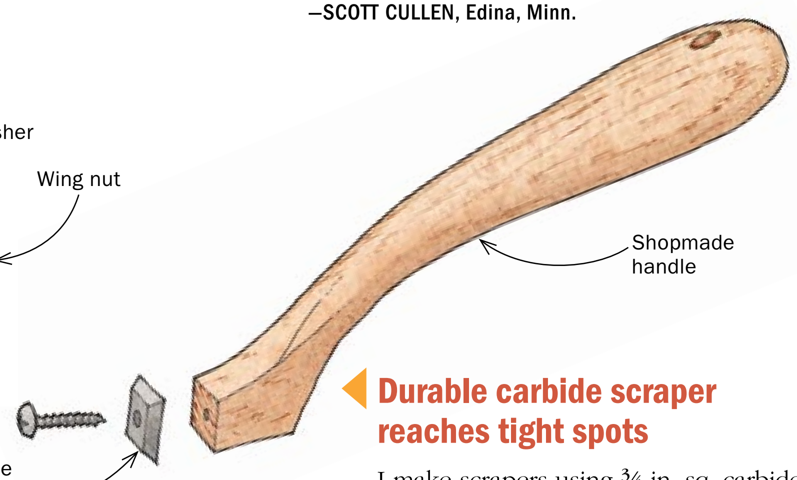




Vise insert prevents racking

This simple little shopmade gadget prevents my vise from racking when the pressure gets cranked up on one end of the jaw. To make it, start by cutting a couple of dozen ⅛-in.- to ¼-in.-thick plywood scraps, each one 2 in. wide by 4 in. long. Then drill a ⅜-in.-dia. hole near one end of each piece. Fasten the pieces together with a ¼-in. bolt, washers, and a wing nut. After snugging up the vise to the workpiece, pivot the plywood spacers down into position as needed at the opposite side of the vise. With the insert in place, the vise won't rack, even if you tighten it down hard.

—SCOTT CULLEN, Edina, Minn.



Durable carbide scraper reaches tight spots

I make scrapers using ¾-in.-sq. carbide inserts for machining metal. These scrapers excel in corner and edge work because the scraper head is small enough to get into tight areas.

The solid carbide is sharp, long-lasting, and maintenance-free. These carbide inserts, which come in different shapes and sizes, have a predrilled mounting hole and feature four separate sharp sides on the same blade. Carbide Depot (www.carbidedepot.com) is one source.

Screw a blade to a homemade handle and you're ready to scrape. Angle or skew the blade if you wish. Although sharpening a dull carbide blade is next to impossible unless you have the right diamond hones, one carbide cutting edge will last a long time if you are scraping only wood and wood glue. Steel scrapers, on the other hand, constantly need tuning up.

I've been using the same four-sided carbide insert blade in one of my scrapers for three years. You just cannot kill one of these tools.

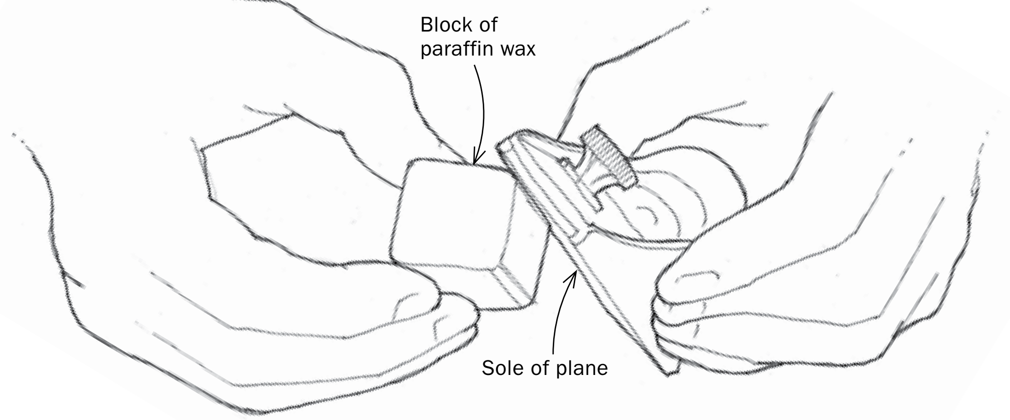
—STUART LIPP, Astoria, N.Y.

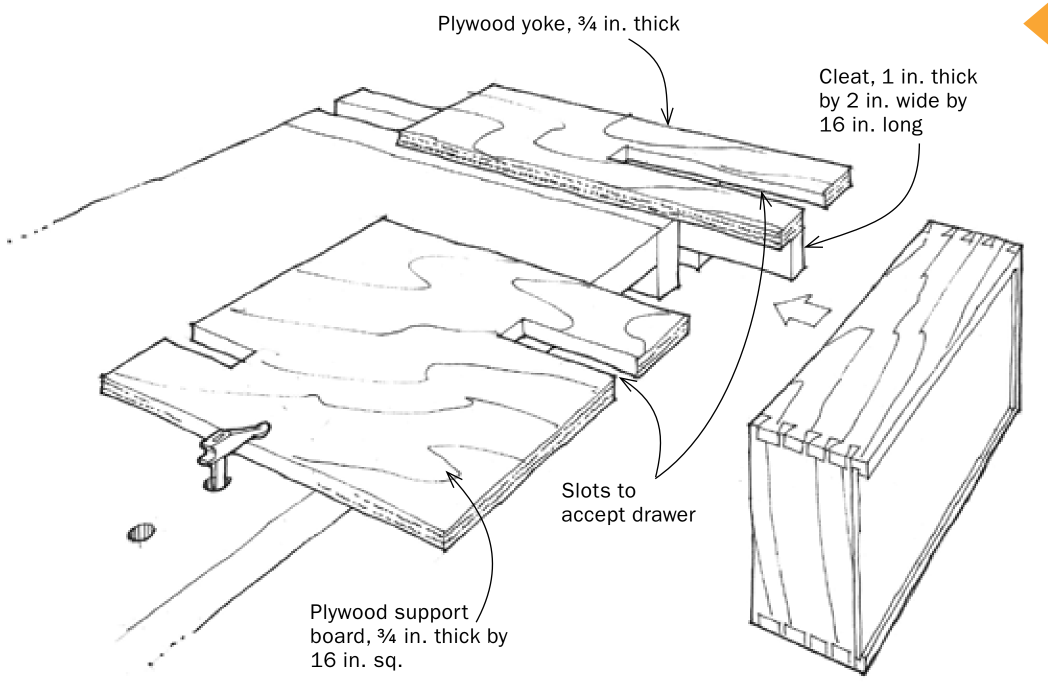
Block of wax makes setting a plane blade easier

I find it difficult to set the depth and tilt of a plane blade by sighting down the sole of the plane or by rubbing my finger across the blade. The alternative method I use is quick, simple, and accurate.

I take a block of ordinary paraffin wax and run it edgewise along the sole of the plane, engaging the blade and producing small shavings on each side of it. The blade depth and tilt are adjusted easily to produce balanced, thin shavings. As a bonus, the paraffin lubricates the sole of the plane so that it glides easily over the wood.

—LOUIS MENGOLI, La Mesa, Calif.





Jig makes it easier to plane sides of drawers

It usually is necessary to plane the sides of an assembled drawer in order to get a perfect fit. But it can be a chore to hold the drawer in place for planing.

The typical routine requires that you clamp the drawer to the side of a bench, take a pass with the plane, unclamp the drawer, check the fit, reclamp, take another pass with the plane, and so on.

With this simple jig, you simply slide the drawer in place and plane, and slide the drawer out to check the fit. The jig provides support so that the sides stay flat. It also holds the drawer in such a way that I don't feel like I'm stressing the corner joinery.

The yoke is a rectangular piece of ¾-in.-thick plywood. A 1-in.-wide slot cut in the yoke accepts either the drawer front or back. Attaching a hardwood cleat to the underside of the yoke allows it to be clamped in the vise.

The support board has slots on each side to accommodate drawers of different depths. I hold it in place by sliding a clamp through one of the benchdog holes, which keeps the clamp clear of the planing area. A bench hook also would work. By flipping the piece end for end and moving the clamp to different benchdog holes, I can fit drawers of almost any width or length. If I can't, I just cut a new slot in the plywood.

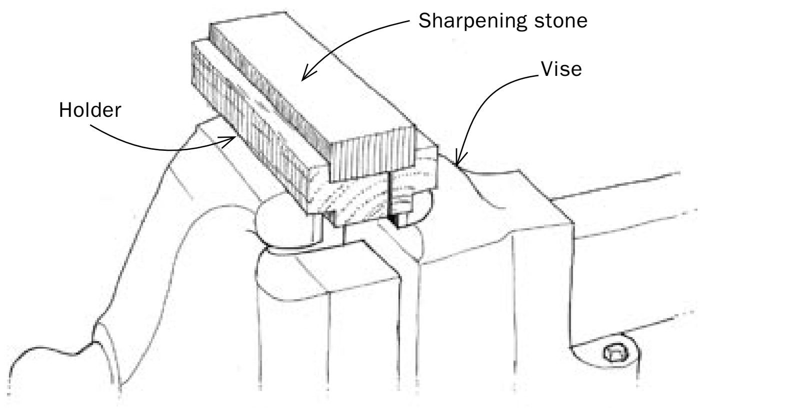
—MARK EDMUNDSON, Sandpoint, Idaho

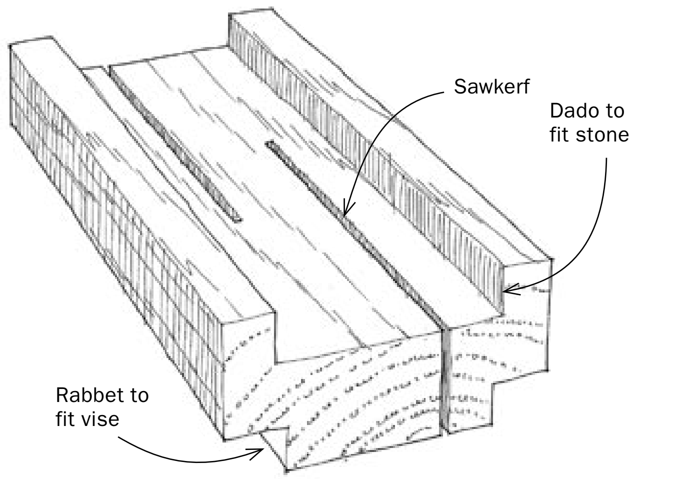
Improved sharpening-stone holder

For years I have been securing my honing stones in a metalworking bench vise, protecting the stone from the metal jaws with a towel. This required careful adjustment of the vise—too much clamping pressure would crush the stone, too little would allow it to fall to the floor. I was never happy with the arrangement. Today, I hit upon this better solution.

To make the holder, start with a scrap block of wood as long as the stone. Cut a dado in the top of the block just wide enough to accept the stone. Also, cut rabbets on the bottom, so the block can be clamped in the vise. Now, from opposite ends, cut two sawkerfs, each about two-thirds the length of the block. Just make sure the kerfs have enough width so that you get an adequate amount of squeeze when the block is tightened in the vise. The fixture is easy on the stone yet holds it securely.

—JOSEPH SCANNELL, Novato, Calif.





Versatile sharpening machine is a good value

Push-pull sharpening method. *The blade is guided into the disk on an adjustable tool rest that keeps the blade square to the disk. An abrasive on the bed of the rest removes the burr from sharpening as the blade is pulled back.*

THE WORK SHARP HORIZONTAL DISK SHARPENING MACHINE is designed to sharpen most chisels and plane irons, as well as turning and carving tools. The machine comes with a basic kit that includes two tempered-glass disks, a slotted see-through disk, and a variety of adhesive-backed abrasive papers that attach to the disks.

To establish and hone the bevel of blades 2 in. wide or less, you work from underneath the disk through a sharpening port (see photo, right). On wider blades, you work from above on the tool rest. The blade is registered against the disk via an adjustable tool rest that can be set in 5° increments from 20° to 35°. An integral fence and guide rail keep the tool 90° to the disk. A small square of abrasive-backed paper on the rest is designed to remove the burr created by grinding. The blade is plunged into the spinning disk and pulled back along the rest to remove the burr. The slotted disks allow you to sharpen turning and carving tools from below while eyeing the edge from above.

The Work Sharp quickly flattens the backs of plane irons and chisels from above, although the smaller-diameter disk is not as versatile and easy to use as the more common 8-in.-dia. disks on other machines I've looked at.

Overall, though, the Work Sharp system performed well, producing edges sharp enough to shave arm hair, and has a reasonable price tag ($200). It is available at www.rockler.com.

—Tim Albers is a part-time woodworker in Ventura, Calif.

Best honing jig gets even better

Rock on. *As you move the jig back and forth on the sharpening stone, the cambered wheel allows you to rock the blade from side to side, in a controlled manner, to generate the curved edge.*

Cambered wheel yields cambered edge. *Veritas now offers a cambered roller for its Mk.II honing guide. It lets you hone a slight curve on a plane blade, so the corners are less likely to dig in and leave ridges on the wood surface.*

WHEN VERITAS INTRODUCED the Mk.II, I felt they had the perfect honing guide. After using it for a while, though, I realized it might be a little too perfect.

The wide roller on the Veritas guide ensures a flat bevel on the blade. That's fine for bench chisels, but on wide blades used for planing, I prefer a bevel with a slight curve (or camber) from one edge to the other. A camber helps reduce plane tracks—the scoring lines often created by the blade corners as you plane.

When honing without a guide, or when using a guide with narrow wheels, I produce the camber by placing pressure on the outer edges of the blade. But because of the wide roller on the Mk.II, I couldn't get the same cambered results.

Someone at Veritas must have read my mind because they recently introduced a cambered roller assembly for the Mk.II. The assembly mounts in seconds. A ½-in.-wide flat center section of the roller provides solid footing for flat bevels, while the outer sections are curved for easy blade cambering. It worked great.

The cambered roller sells for $21.70 at www.leevalley.com.

—Michael Pekovich is *Fine Woodworking*'s art director.

Handy router planes from Lie-Nielsen

I USE A ROUTER PLANE ALL THE TIME in my shop. Indeed, over the years, my antique Stanley No. 71½ has proven invaluable. The tool makes it easy to smooth the bottoms of dadoes, grooves, and rabbets. It's perfect for adjusting the fit of a hinge mortise and doing inlay work, too.

Lie-Nielsen recently introduced two new router planes, the No. 71 and the smaller No. 271. I gave both a good workout in my shop.

Despite my fondness for the old Stanley, the Lie-Nielsen No. 71 takes the tool to a new level. A square hole in the base accepts a massive O-1 steel blade. You adjust the blade with one knob, and then tighten it in position with another. The depth of cut can be changed quickly and precisely, a nice feature for "sneaking up" on a perfect fit. A depth stop is easily adjusted and locks securely.

The blade does not come prelapped. You'll need to lap and then sharpen it before cutting.

Like its bigger brother, the No. 271 is a precision tool, albeit a simpler one. It doesn't have an adjustment knob; you move the blade up and down by hand. The tool is comfortable to hold and capable of doing exacting work. It's best used on smaller parts, where a large router plane wouldn't fit or balance well.

Of the two, I'd buy the No. 71 first, mainly because its larger size is better suited to general woodworking tasks. It sells for $125; the No. 271 for $75. For more information, go to www.lie-nielsen.com; 800-327-2520.

—Jeff Miller builds furniture and teaches woodworking in Chicago.

Medium shoulder plane will be a classic

I USE SHOULDER PLANES FOR MANY JOBS, from trimming tenons, to refining dadoes and rabbets, to cleaning up machine marks. Lie-Nielsen has introduced a midsize shoulder plane called the 042 that traces its roots back over a century to the classic shoulder plane design of Edward Preston, and more recently, Record. Though the lineage is clear, Lie-Nielsen has made some improvements.

The bronze cap, which also serves as a palm rest, is a bit higher, making the tool more comfortable to hold and giving more hand clearance. The foot of the cap extends closer to the blade's bevel, improving its dampening abilities. The premium A2 steel blade is thick (0.150 in.). And the mouth is more precise and easier to adjust.

The plane is 7¾ in. long, ¾ in. wide, and weighs 2.35 lb. At its highest point, it stands 3¾ in. tall. It fits the hand well and has heft, but is not so heavy that it's tiring to use.

The plane was perfect out of the box. After just a few minutes honing the blade, the tool's performance was first-rate. It sells for $175 at www.lie-nielsen.com.

—Chris Gochnour is a woodworker and hand-tool aficionado in Murray, Utah.

Photos: staff

Fine chisels for finest work

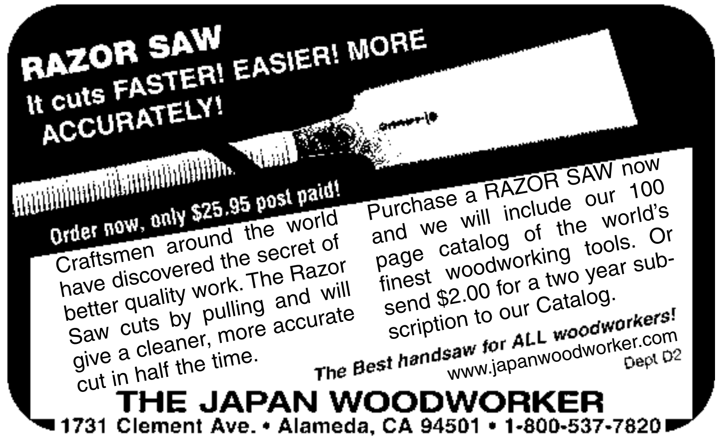
A NEW SET OF DOVETAIL CHISELS from Blue Spruce Toolworks includes four standard-size chisels (⅛ in., ¼ in., ⅜ in., and ½ in.), but there's nothing standard about these tools.

After a quick honing on a fine stone, the tools were ready to go. The A2 steel blades are thin, with concave edges that allow you to reach into the tightest of places. And being made from A2 steel, they hold their edges exceedingly well. The cocobolo handles are not only attractive, but they're also comfortable.

The right chisel for tight corners. *Blue Spruce dovetail chisels have concave edges, giving them access to tight places.*

These chisels aren't made for removing a lot of waste. Rather, they are best-suited for fine, precise joinery work. While I can't recommend these chisels as a first set, they make perfect supplements to a veteran's tool collection—a Stradivarius within reach. The set sells for $230, but you can purchase the chisels individually. For information, go to www.bluesprucetoolworks.com.

—Rich Macrae is a hand-tool junkie and an active member of the Long Island Woodworkers Club.



BY CHRIS GOCHNOUR

How to read grain direction

***Don't let figure fool you.** While the cathedral patterns suggest that Gochnour is planing the edge of this cherry board against the grain, tiny vessels on the face of the board indicate that he is going the right way.*

Wood's beauty and appeal can be credited to the uniqueness and diversity of its grain. These same virtues, however, turn to vice when it comes to surfacing and smoothing lumber. The secret to achieving smooth surfaces with machine and hand tools is cutting in the direction of the grain. Sometimes grain can change direction on a single board. Worse, depending on the species you're working with, grain direction is not always obvious.

While you have a 50:50 chance of success by just guessing which direction the grain runs, you can increase your odds greatly by studying a board for clues, listening and feeling as you mill the wood or work it by hand, and making midcourse corrections when necessary.

Start by using your eyes

You can determine the grain orientation of various hardwoods by observing their physical characteristics. In some hardwoods, you can determine the grain direction simply by looking at the rays, which are wood cells that radiate from the center of a tree to its perimeter. They appear vividly in species such as oak, beech, and sycamore as dark, solid specks of varying lengths.

Rays can be difficult to make out on some species, in which case I look for vessels to determine grain direction. Vessels are wood cells that extend linearly in hardwood and appear most prominently in species such as mahogany, walnut, and butternut. They appear on the surface of the board as long, open tubes and on the end grain as small, open pores.

Because many species display neither rays nor vessels to the naked eye, figure (which often is referred to as grain) is the last characteristic I look at to assess grain direction. However, it's not uncommon for grain to run opposite the figure, so this isn't always the most reliable source. In woods that don't have prominent vessels or rays, such as cherry, maple, and alder, figure is the best characteristic to go by.

Then pay attention while cutting

While rays, vessels, and figure can be a good indicator of grain direction, some woods will deceive you. Also, it is rare to find a board in which all of the grain is going in the same direction. As I work, I watch, feel, and listen to the progress of my cut, always assessing how the wood is responding to the blade. If I hear the snap of breaking fibers while using machines, I ease up on the speed of the pass, lighten the cut, and try feeding the board in the other direction on the next cut. With properly tuned equipment, moderate cuts, and a slow feed rate, boards with changing grain direction can be accommodated.

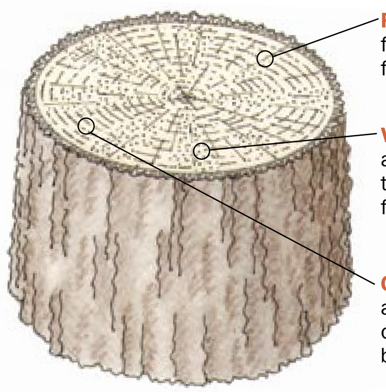
Sometimes you will come across a board that tears out in every direction. This is especially the case with highly figured boards, such as bird's-eye maple or curly woods. One solution is to dampen the surface of the board before passing it across the cutterhead. You also can try sending the board through the machine at a skew; that way you are cutting across the grain rather than attacking it head-on.

Handplanes are more sensitive than machines, so you will feel when a cut is going against the grain. One advantage of handplaning is that you can plane different areas of the surface in different directions, though long, continuous strokes are always preferable.

When milling lumber, keep track of the grain direction. Mark the edges and faces of boards to indicate the best way to feed them through the machines, and stack them in that orientation. □

To work the edge, examine the face

Determine the grain direction on the edge of a board by studying the orientation of rays, vessels, or figure on the face. Some species of wood display these characteristics more prominently than others.



RAYS

Wood cells that radiate from the center of a tree appear on the surface of a board in cross section as dark specks or lines. The rays on this oak board run opposite the cathedral patterns, proving that figure doesn't always go in the direction of the grain.

VESSELS

Wood cells that extend linearly on hardwood appear as long, open tubes on the surface and as small, open pores on end grain. Woods such as walnut (shown here), butternut, and mahogany have prominent vessels that make it easy to read grain direction.

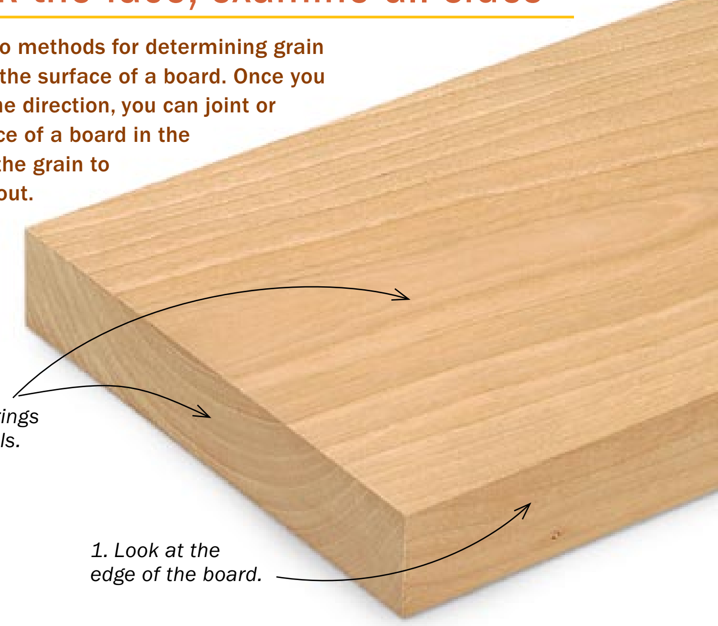
FIGURE

Often referred to as grain, figure is the result of the annual growth rings intersecting with the surface of a board. In species such as alder and maple (shown), rays and vessels are difficult to make out, so reading the figure is the only option to determine grain direction.

***Glued-up panels pose a problem.** It's not possible to examine the edges of a board for grain direction if the board is in the middle of a glued-up panel, so you must rely on its figure to guide the way.*

To work the face, examine all sides

There are two methods for determining grain direction on the surface of a board. Once you determine the direction, you can joint or plane the face of a board in the direction of the grain to prevent tearout.



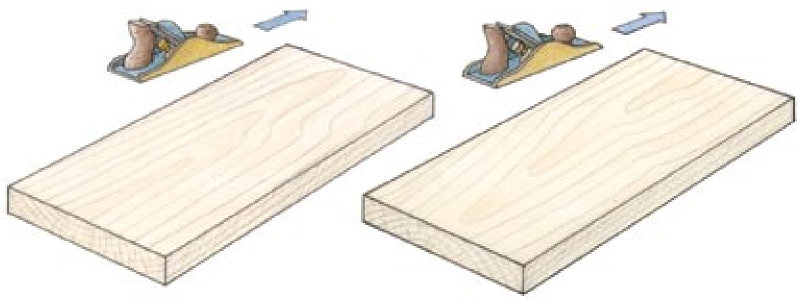
INSPECT THE EDGE

Studying the rays, vessels, and figure on the edge of the board can help determine the grain direction on its face.

***Use what you can.** The direction of the vessels on this piece of walnut (left) indicates the direction of the grain and determines which way the adjacent surface should be worked. On a maple board (right), the figure points the way.*

READ THE RINGS AND CATHEDRALS

The growth rings on the end of the board appear as cathedrals on its face. Together, they create a topographic map of the grain.



If the growth rings arch downward, cut in the direction the cathedrals point.

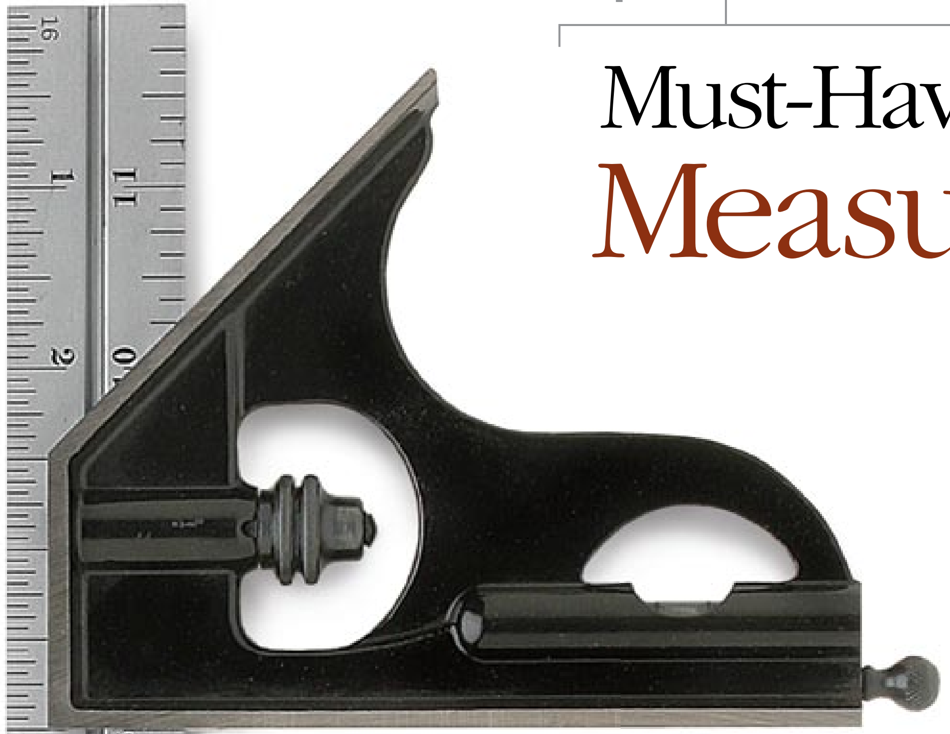
If the growth rings arch upward, cut into the cathedral points.

Photos: staff; drawings: Vince Babak

Must-Have Tools for Measuring and Marking

Accurate layouts become routine when these 11 tools are close at hand

BY CHRIS GOCHNOUR



Careful layout is important to every woodworking project. Measure or mark a part inaccurately and it will cause big problems along the way.

That point was driven home recently as I taught a woodworking class where students used mostly hand tools to build a Hepplewhite writing desk. As the class progressed, the correlation between effective layout and successful woodworking was clear. Students who carefully laid out their projects with crisp, concise markings built their desks quickly and efficiently, with fewer setbacks. Students who laid out their projects with faint and irregular markings had to work at a slower, less productive pace. Not surprisingly, the latter group took longer to complete their desks, and the quality level was not up to that of the other students.

All that led me to consider my favorite measuring and marking tools, the ones I keep within easy reach and use nearly every day. These 11 tools are as important to my work as any hand or powered cutting tool. A well-equipped workshop, I feel, should include one of each.

Chris Gochnour builds furniture in Murray, Utah, and teaches woodworking around the country.

12-in. combination square

A square and more. *Perfect for scribing a square line on boards up to a foot wide, this tool has several other features that come in handy.*

The 12-in. combination square is an 8-in-1 tool that I find indispensable. Its versatility comes from the unique shape of its head and an adjustable blade that's incrementally marked as a rule.

A 12-in. combination square can be used as a long- or short-bladed try square, as well as a miter square. The adjustable rule enables it to serve as a depth gauge to verify the depth of a mortise, dado, or hole. It also can be set up as a height gauge to check tablesaw-blade or router-bit height. Used with a pencil, it can scribe lines parallel to board edges, much like a marking gauge.

A glass level vial, set in its head, verifies that things are plumb and level. As a final benefit, the blade can be removed altogether and used as a precision rule or straightedge.

Inexpensive, discount-store varieties are usually not well marked or machined. To get the most from a combination square, it's best to purchase one from a reputable maker of precision engineer's tools.

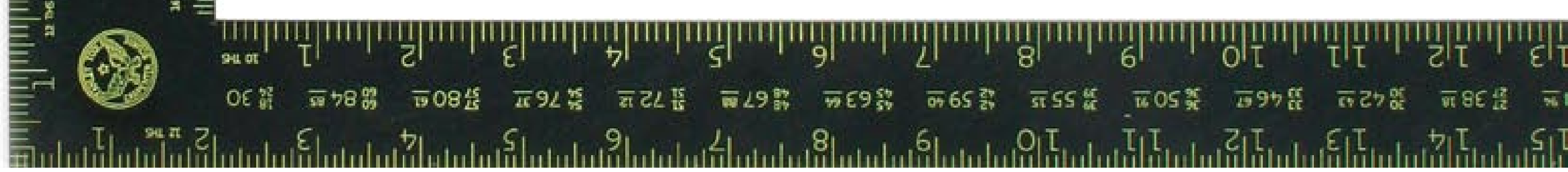
Framing square for bigger jobs. *When scribing a line across a wide workpiece, like a panel, a framing square is Gochnour's tool of choice.*

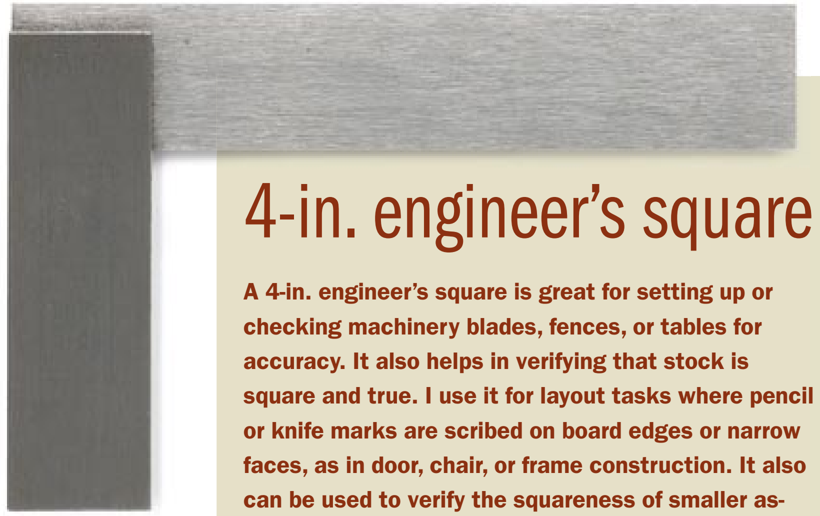
Framing square

Another square I find useful, particularly for large-scale work, is the framing square. Although generally viewed as a carpenter's tool, it is extremely useful in the woodshop. Made from one piece of aluminum or steel, roughly ⅛ in. thick, with one arm incrementally marked to 16 in. and the other to 24 in., it serves as a jumbo try square for larger work.

Among other tasks, I use mine to lay out cut lines on panels or wide lumber, to define joinery across wide case pieces, to test the corners of panels to verify accuracy, and to check case assemblies for squareness during glue-ups.

Although framing squares are not expensive and generally are not viewed as precision tools, I've used the same one for 20 years and have never had to true it up. I treat it with care, and like an old friend, it has never let me down.





4-in. engineer's square

A 4-in. engineer's square is great for setting up or checking machinery blades, fences, or tables for accuracy. It also helps in verifying that stock is square and true. I use it for layout tasks where pencil or knife marks are scribed on board edges or narrow faces, as in door, chair, or frame construction. It also can be used to verify the squareness of smaller assemblies, such as doors, drawers, cases, and the like.

Made of precision-milled steel, engineer's squares are dead accurate. And they stay that way indefinitely, given proper care. They are relatively inexpensive, and the little extra spent on a reputable brand will pay for itself in the long run.

Compact and precise. *Small enough to fit into the pocket of a shop apron, a 4-in. engineer's square has a lot of good uses in the shop, including, as shown, scribing the end lines on dovetail joints.*

Photos, except where noted: Tom Begnal; individual tools: Rodney Diaz

12-ft. tape measure

I use a steel tape for many of my day-to-day measuring tasks. Tapes range in length from 8 ft. to 25 ft.; the blade widths run from ½ in. to 1 in. I like a 12-ft. tape. It's long enough for most furniture-making needs, but not so heavy as to weigh down my pocket or belt.

I prefer a ¾-in.-wide blade, simply because it is more rigid than the ½-in. That's useful when the blade must extend unsupported in order to make a measurement. The blade markings should be clear and easy to read.

I use a tape for most inside and outside measuring tasks. The hook on the tape end is designed to move in or out its exact thickness, enabling the tape to read inside and outside measurements accurately. If the hook is bent, the measurement will be inaccurate. Periodically check the hook against an accurate rule, and correct as needed.

If real precision is required, I like to bypass the tape's hook and line up the tape on the 10-in. mark, take the reading, and then subtract 10 in.

Tape measure gives all-around accuracy. *As workpieces get bigger, a tape measure is the ticket to long measurements.*

6-in. steel rule

A 6-in. steel rule is handy for setting the fences on tablesaws, routers, marking gauges, or plow planes. I also use it to set up blade or bit heights and to check stock thickness. It's great for laying out the full range of joinery, from mortise-and-tenon and dovetail joints to dowels and biscuits.

Look for a rule with markings etched into the steel, as they generally are easier to read. The markings should run from end to end so that you can measure from an inside corner. A rule that also has marks parallel to one end (not shown) is a plus, as it makes some height adjustments easier.

Easy to use. *A short, easy-to-read, 6-in. steel rule is perfect for precise measuring and marking.*

Marking knife

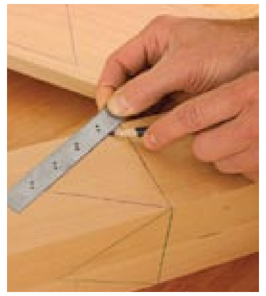
When a task requires a finer line than a pencil can make, a marking knife is my tool of choice. One of my favorites is a version called a striking knife. It has a slender blade that tapers to an acute point, which is easy to slip between tight spaces and reach into tight corners. The blade is flat on one face but has two bevels on the other, making it suitable for both left- and right-handed marking. The flat face also allows it to fit right up to an edge. The blade is housed in a comfortable handle that is easy to grasp and enhances precision and control.

Use a marking knife for sharp lines. *For scribing razor-sharp lines, even in tight places, a marking knife is a handy tool.*

Pencils

I use a variety of pencils, each suited to a particular task, such as marking boards for rough dimensions, basic joinery layout, designating waste areas, and shop math. For general shop use, I prefer a No. 2 pencil, sharpened to a point with a conventional sharpener. For jobs such as dovetailing, where a finer, more precise line is needed, I use a No. 3 pencil because it has harder lead. I shape the point with a block plane and sandpaper to create a fine, knifelike edge.

Colored pencils also are useful. For dark-colored woods like walnut and wenge, the mark from a white-lead pencil is easier to see. I use other colors on all wood types to define and designate cabinet or chair parts.

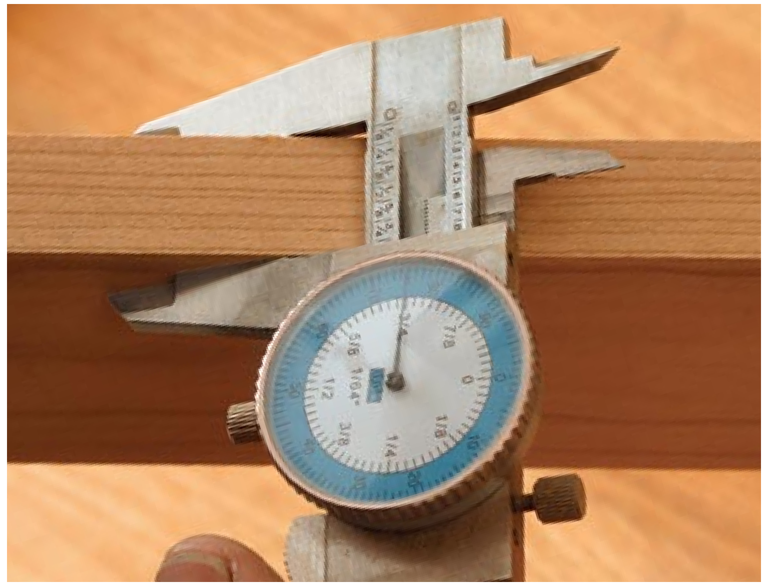


Colored pencils offer good visibility. *Using pencils of different colors can help distinguish between similar parts. Also, lines from a white-lead pencil tend to show better on dark-colored woods.*

A cleaner line. *Gochnour uses a No. 3 pencil when it's important to get an extrafine mark or line, but first he shaves the wooden end to a flat point on his handplane and then further hones the lead on a piece of fine sandpaper.*

Fractional dial caliper

Dial calipers generally are viewed as machinists' tools, but they are indispensable in the woodshop. They are capable of inside, outside, and depth measurements. A thumbscrew locks the jaws for measurement transfer. I find dial calipers helpful for verifying stock thickness, checking joinery size and spacing, and measuring turned parts. Very affordable dial calipers are widely available with plenty of precision for woodworking tasks.



When precision is a must. *When it comes to fine measuring, few woodworking tools match a dial caliper. The decimal scale can measure to within 0.001 in.*

Parallel lines. *The combination gauge shines when you need to scribe a number of identical mortises.*

Marking gauge

A combination-type marking gauge offers the user two options. One side of the gauge has a single pin, the other has a pair of pins. It is important to sharpen all the pins to a keen edge that will produce a knifelike cut.

The single pin is used to scribe lines parallel to a board edge. It's used across the grain for such tasks as scribing a baseline for dovetails or a tenon shoulder. Working with the grain, the single pin on a combination gauge can define a rabbet cut, or scribe a reference line to work to while dimensioning stock with hand tools.

The side with two pins can serve as a mortise gauge, allowing you to scribe simultaneously two lines parallel to a board's edge.

Scratch awl

Traditionally, an awl was used for scribing lines with the grain or on end grain where knife marks are more difficult to see. I like to use an awl to mark the center of drill-hole locations. The impression left by this pointed tool helps to center the bit and ensure precise drilling whether you use a twist, brad-point, or auger bit. It also can be used to locate or start a center for lathe work.

Awls come in all shapes and sizes. The bottom line is to get one with a comfortable handle. I like it to have a few flat spots to keep it from rolling off the bench and a tapered, cylindrical shaft that terminates in a sharp conical point. Plain or fancy, take your pick.

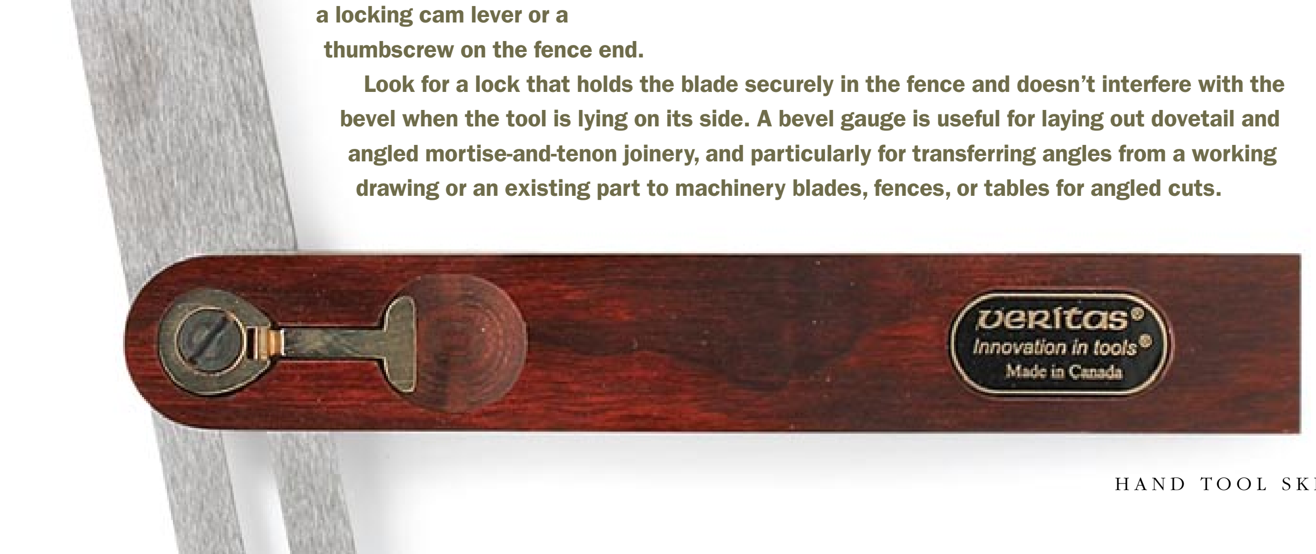
Center-point marker. *Although it can be used to scribe lines, the awl is especially useful for marking hole center points.*

Bevel gauge

A bevel gauge, or sliding T-bevel, adjusts to lay out or transfer a full range of angles. The gauge consists of a fence and an adjustable, slotted blade that can be locked securely at the required angle. The fence is typically wood, metal, or a combination, with plastic used on the cheaper models. The blade is generally steel. Various means are used to lock the blade in the fence, ranging from a simple wing or knurled nut to a locking cam lever or a thumbscrew on the fence end.

Look for a lock that holds the blade securely in the fence and doesn't interfere with the bevel when the tool is lying on its side. A bevel gauge is useful for laying out dovetail and angled mortise-and-tenon joinery, and particularly for transferring angles from a working drawing or an existing part to machinery blades, fences, or tables for angled cuts.

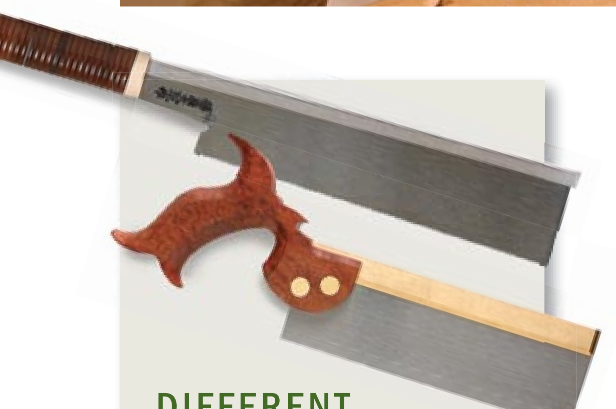
For marking angles. *A bevel gauge comes in handy when you need to scribe an angled line.*



ESSENTIAL **GEAR**

Choosing and Using Handsaws

Push vs. pull: Two experts go to bat for their favorites



DIFFERENT STROKES

Woodworkers turn to saws with stiff backs to make precise joinery cuts, but there are two main types. Japanese saws (top) are thin and cut on the pull stroke; the Western type has a thicker blade and cuts on the push.

Japanese-style saws are affordable and razor-sharp out of the box

BY CHARLES DURFEE

My first woodworking years were spent building traditional wooden boats with a small group of similarly wide-eyed enthusiasts. We would gather around the woodstove to warm our fingers, and invariably the conversation would be about tools.

Our handsaws were the typical carpenter's variety: crosscut and rip, with an occasional backsaw. Sharpened as best we could, they cut pine and cedar adequately, struggled in oak and mahogany, and in general made sawing by hand an unwelcome chore.

Then one day a shopmate came in holding a carefully wrapped, slender package. He pulled out a strange-looking saw with a thin blade and a long, straight handle. He explained that the blade was so thin because this type of saw cuts on the pull stroke, an action that keeps the thin blade from buckling. The narrow blade naturally creates a thin kerf or cut, which means it requires less effort to remove less wood, and it cuts faster.

We tried the saw. It was like touching the pedal of a Jaguar after driving a Ford all your life. The saw raced through the cut, straight down the line. It was my first exposure to Japanese handsaws, and I've been a fan ever since.

Japanese saws arrive ready to cut, with razor-sharp, hardened teeth that stay sharp longer than those on Western saws, and some blades can be replaced when they dull, at a cost of $20 to $30. My saws last as long as 10 years under frequent use in a professional shop.

All cut smoothly in our tests

When I tested these saws in 2006, they all arrived very sharp, which made it easy to start cuts. And all cut straight down a line with minimal guidance. All the saws also had a lovely, smooth action, with only subtle differences between them. I also examined the quality of the cut. All the saws left smooth side walls that would be fine as is for joinery.

Using a pull saw

It takes time to become comfortable with the pull-stroke action of a Japanese saw, but any new tool takes some getting used to. Because of the thinness of the saw, use a light touch in general, but especially on the forward stroke to avoid buckling the blade. For other tips, see the photos above.

Charles Durfee is a furniture maker in Woolwich, Maine.

THREE WAYS TO HOLD THE SAW

End of the handle. *Durfee prefers to hold the saw near the end of the handle for a light touch.*

Finger pointing. *An alternative is to extend the index finger along the length of the handle to help direct the saw.*

Tuck the handle in. *Some users prefer to hold the handle close to the blade and keep the end of the handle close to their side to help guide the saw.*

STARTING A CUT

Guide the cut with your thumb. *Angle the saw very slightly and start cutting at the back corner. Use very light cuts and let the teeth do the work.*

CORRECTING A CUT

Back out and try again. *If you find that the cut has drifted off course, don't try to correct it by tilting the saw; the thin blade will bend. Instead, back the blade out and start again at a steep angle until you are back on the right line.*

AUTHOR'S FAVORITES

Sawing dovetails is a rip cut, so a saw dedicated to dovetailing calls for a rip-tooth pattern. However, ripsaws are quite rough when used for crosscuts. So if you are buying just one saw, go with a good crosscut saw, which will do that job beautifully and also rip smoothly, though more slowly than a dedicated ripsaw.

1 GYOKUCHO
Source: www.japanwoodworker.com
Price: $39
Comments: The Gyokucho 9½-in. dovetail saw is an excellent ripsaw at a great price. It also has a replaceable blade.

2 DELUXE RIP DOZUKI
Source: www.toolsforworkingwood.com
Price: $90
Comments: This dedicated ripsaw also makes very smooth dovetail cuts, but significantly faster than the Gyokucho.

3 DOZUKI "Z" SAW
Source: www.woodcraft.com
Price: $42
Comments: The best all-purpose dozuki, this affordable crosscut saw also does an excellent job on dovetail (rip) cuts.

Photos: Michael Pekovich

Western-style saws are sturdy and easy to steer

BY CHRIS GOCHNOUR

Hand-cut dovetails are a hallmark of craftsmanship, adding unmatched beauty, detail, and strength to a project. I often tell students that dovetailing by hand isn't difficult. But mastering the dovetail saw requires perseverance, and having the best tool for the job can make all the difference in the world.

Both Japanese and Western-style saws have their advocates; I prefer the Western style because of its sturdy construction and thicker steel. I also prefer the control of the push stroke.

For a recent review in *Fine Woodworking*, I tried 11 Western-style dovetail saws to evaluate their overall performance and value right out of the box. I used each one extensively in cherry, oak, and maple, making cuts with the grain and across it. I observed how fast each saw cut, the ease with which it started a cut, how smooth the saw was throughout the cut, and how well it tracked a line. I also checked the saw's quality of construction and ergonomics. My three favorites are listed at far right.

What to look for in a dovetail saw

Since I focused on cutting dovetails in my testing, and dovetails cuts are with the grain, I chose saws sharpened for rip cuts. The number of teeth per inch (tpi) also affects performance. Saws that performed well generally had blades with 15 tpi to 20 tpi—fine enough to handle precise cuts but aggressive enough to cut quickly and take on the occasional cut across the grain.

When cutting dovetails, I favor a saw that leaves a narrow kerf because the saw encounters less resistance and cuts with less effort. The kerf width depends on the thickness of the saw plate (blade) and the amount of set in its teeth.

Longer blades cut faster—Dovetail saws range in length from 8 in. to 10 in. Saws with longer blades tend to cut faster and more efficiently because they allow longer strokes. Shorter saws, on the other hand, cut slower but their short strokes may give you more control over the tool for precise cuts. I generally prefer the longer saws because of the efficiency of the stroke and, consequently, the speed at which they cut.

Some woodworkers prefer pistol-grip saws, while others like to use gent's saws. So I tested both types.

Better results with a Western-style saw

Cutting dovetails by hand requires precision, and a few tips can make all the difference. Mount the board low in a vise to minimize deflection and vibration. Stand relaxed with your weight evenly distributed and your arm aligned with the saw. A wide stance will bring you closer to the work and will help you avoid fatigue.

Starting a cut in end grain is tricky. A real light touch is the key. Use your thumb to guide the saw (see right photo, above), and slowly apply more force as you cut. Once the cut is established, angle the saw slightly upward. Check your progress frequently to be sure you are following the layout lines. As you reach the baseline, level the saw, ensuring that you don't cut too deep on either side.

Chris Gochnour makes furniture in Murray, Utah, and teaches woodworking around the country.

Photos: Thomas McKenna

GRIPPING A DOVETAIL SAW

Pistol grips run small. *For comfort, use a three-fingered grasp on a pistol-grip saw, with the index finger pointing forward.*

Palm a gent's saw. *The turned handle of a gent's saw is designed to sit in the palm of the hand, with the index finger providing control.*

CUTTING WITH A DOVETAIL SAW

Wide feet, light touch. *Spread your feet to brace yourself and get closer to the work. Starting cuts (above) in end grain can be tricky, but a very light touch is the trick. Use your thumb to guide the blade.*

AUTHOR'S FAVORITES

There are two handle styles. Gochnour prefers pistol-grip saws because they can handle any dovetailing task in materials of any thickness. Gent's saws are best for making rapid, precise cuts in thinner material (¼ in. to ⅝ in.).

PISTOL-GRIP SAWS

ADRIA

Source: www.adriatools.com

Price: $130

Comments: The factory sharpening job is superior, making the Adria the fastest-cutting saw tested. It also left a thin, clean kerf and tracked a dead-straight line.

CROWN

Source: www.highlandwoodworking.com

Price: $75

Comments: Although the teeth had more set than Gochnour likes, the saw cut fast and smooth, and he had no trouble starting a cut.

GENT'S SAWS

CROWN

Source: www.highlandwoodworking.com

Price: $24

Comments: The turned handle feels good in the hand, and makes the saw easy to align and track. Cuts were fast and easy to start. Given its low price, the author was surprised with how much he liked this saw.

All About Chisels

Mortise? Bench? Butt? What do you need? We tell you what the catalogs don't

BY BOB SMALSER

Are you a bit overwhelmed by the array of chisels available today? I've been at this craft since the late 1950s and I still get confused. Back then, I worked part time in my uncle's boat shop, sharpening edge tools and handsaws for two lifelong wooden-boat builders. With generations of family tradecraft behind them, these gentlemen worked primarily with hand tools at a no-nonsense, commercial pace that would astound most modern woodworkers. I've followed in their professional footsteps ever since.

Pick up any two woodworking books and you'll find inconsistencies in the labels craftsmen apply to their chisels. That's because what a chisel is called is generally based on its function, not its shape, and varies depending on the trade, era, or country in which it was used. That said, specific functions require chisels shaped in specific ways. You'll find, for example, that mortise chisels from different cultures and times have similar characteristics. Read on to understand those characteristics and how they relate to the chisels sold today. I'll also mention a couple of older tools you can only find used.

Bob Smalser is a woodworker and boatbuilder in Seabeck, Wash.

Online Extra

In 10 short videos, Garrett Hack answers readers' questions on choosing, sharpening, and using chisels. Go to **FineWoodworking.com/HTextras.**

Photos: Andy Engel

Chisel anatomy

A chisel is a simple tool—just a cutting edge attached to a handle. However, there are subtle differences found in both components. There are two main types of handles, with various designs to prevent them from splitting when struck. And it's crucial to choose a chisel made from good steel with the appropriate bevel for a given task.

LEATHER WASHER

STEEL HOOP

TANG HANDLE

SOCKET HANDLE

GETTING A HANDLE ON THINGS

Chisels come with either tang or socket handles. Tang-handled chisels have a tapered steel shank at one end, similar to that of a file. It's driven into a stepped or tapered hole bored in the handle, with a brass or steel sleeve, or ferrule, fitted to deter splitting. If the tang is bedded in epoxy for a perfect fit and the ferrule is strong, the handle can withstand a good bit of pounding without cracking the ferrule or splitting the wood.

Socket handles were preferred in earlier days because work didn't have to stop when the handle broke; the tradesman simply pounded the socket until he found time to replace the handle. Socket chisels are more expensive to make than tang chisels, but their handles tend to last longer and are replaced easily. Today, they are found only in a few premium brands. Many modern bench and mortise chisels look like they have traditional sockets but really don't—cut the handles off and you'll see they are tang chisels with a socketlike appearance.

The striking end of the heavier-duty chisel often is protected to prolong the life of the handle. This protection can range from leather washers on bench chisels to steel hoops or striking rings for heavy mallet work.

THE TASK DETERMINES THE BEVEL ANGLE

Bevel angles are usually the result of a compromise between sharpness and toughness. Chisels designed to pare thin shavings are ground with shallow, razorlike bevels of 15° to 20°. Whack them with a mallet, and you'll quickly break down that fine edge. Chisels intended for general use are found with 20° to 30° bevels. Mortise chisels are ground with 30° to 40° bevels that support the cutting edge and enable it to stay sharp as mallet blows drive it into the wood. The trade-off is that mortise chisels don't pare as well.

The characteristics of the steel affect the bevel angle. Generally, the harder the steel, the steeper the bevel must be to prevent chipping. Blades laminated with very hard steel at the cutting edge, as found in most Japanese tools, require steeper bevels.

You can add a secondary or microbevel to the cutting edge to make the honing process faster. A secondary bevel is achieved by raising the chisel handle an additional 2° to 5° during honing. Since only a few thousandths of an inch actually does any cutting, why hone the entire bevel every time? Of course, continued honing of only the secondary bevel will, in time, increase its size until the speed advantage is lost. So, on every third or fourth honing, I lower the handle and restore the main bevel on a coarse stone.

PARING CHISEL

BENCH CHISEL

MORTISE CHISEL

Bevel-edge chisels

Most tool chests house a few bevel-edge chisels, whose angled sides ease working in tight quarters. There is some loss of strength, which doesn't affect, for example, a carpenter's butt chisel that mainly cuts out hinge gains, or a paring chisel that shaves with the push of a hand. Bench chisels will tolerate light mallet blows. Firmer chisels are slightly heavier versions of bench chisels.

BENCH AND FIRMER CHISELS: THE WORKHORSES
Bench chisels are basic, all-purpose tools required in every shop. Their cutting-edge bevel of 20° to 30° is a good compromise that can pare tenons, trim dovetails, do light chopping, and cut shallow mortises for hardware. Bench chisels also can be used to square up the sides of deep mortises after the bulk of the wood has been drilled out. Bench chisels often are called bevel-edge chisels, but they're actually a subset. *Bench* implies a longer chisel used and kept at the workbench instead of in a portable carpenter's box or shipwright's chest, where shorter chisels are stored more easily. The longer chisel is easier to hold plumb for accurate cutting, and is preferred where practical.

Over the decades, the label "bench chisel" also has been applied to what we now call firmer and paring chisels. In today's tool catalogs, bench chisel generally refers to a medium-length, bevel-edge chisel with a blade of moderate thickness and strength.

Firmer chisels are the same length or slightly longer than bench chisels but are made of thicker, heavier steel; usually straight-sided, sometimes bevel-edged. Their 30° cutting-edge bevels make them appropriate for paring and moderate striking. They generally have socket handles, but also come in the tang-handled "registered" pattern (like the mortise chisels on p. 32). Firmer chisels are made for fairly hard chopping in heavier stock.

BUTT CHISELS: TOOL-POUCH STANDARDS
A butt chisel is any short chisel, usually with beveled edges and a design suitable for paring and moderate striking. Its cutting-edge bevel is usually 25° to 30°. Butt is an archaic word for hinge. These chisels were typically a finish carpenter's or shipwright's pocket chisel, easy to carry and store, with a major role in hanging doors and all-around trimming.

Today, butt chisels are inexpensive tools sold in almost every hardware store. They are important for repair work in spots too tight for bench chisels and too close to nails and other hardware, where you don't want to risk your more expensive bench chisels. Many older butt chisels began life as bench chisels, and as repeated sharpening wore away the length, their tradesmen owners reground them, added new handles, and turned them into butt chisels.

PARING CHISELS: ELEGANT TOOLS FOR FINE WORK
Longer and thinner than bench chisels, paring chisels have 15° to 20° cutting-edge bevels. This knifelike bevel can be honed to a fine edge, but that edge doesn't stand up to impact. That's fine, because paring chisels are meant to be pushed, not struck. They are cabinetmaker's chisels made to reach deep into a carcase or drawer to remove small wood shavings for a perfect fit. Paring-chisel blades often are forged with a slight bend in them to provide handle clearance when making a flush cut. They are elegant, lovely tools. Any chisel, however, can be reground into a paring chisel, and through the years many shipwrights, interior joiners, and finish carpenters have carried a short butt chisel with a thinned, finely beveled blade used for light trimming in conjunction with their block plane.

Some paring chisels have severely "cranked" or bent handles for clearance. These were used primarily by pattern makers making negative patterns in soft pine or basswood. If there is no wood carving in your immediate future, then you probably don't need these, as bench or butt chisels used bevel-down can perform many of the same tasks.

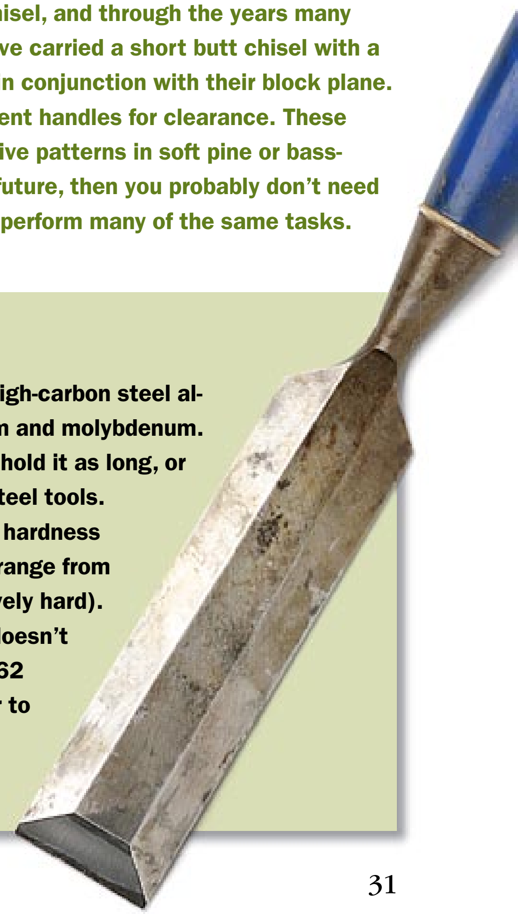
THE COLD FACTS ABOUT CHISEL STEEL

Today, all types of steel are uniform and of high quality, but that wasn't always the case. As a result, trade names from the late 1700s are still used for high-quality steel such as Crucible and Sheffield. These high-carbon steels remain the mainstay of edge-tool production. Properly forged and heat-treated, high-carbon steel takes an excellent edge and sharpens easily.

High-speed steel sometimes is used for chisels. Chromium, tungsten, molybdenum, and vanadium are added to resist softening when overheated. Used primarily in drill bits and lathe tools, this steel holds its cutting edge longer than carbon steel, but is very difficult to hone.

The modern compromise is A2, a high-carbon steel alloyed with small amounts of chromium and molybdenum. A2 blades take a very good edge and hold it as long, or longer, than the best prewar carbon steel tools.

Catalogs often state the Rockwell hardness number (Rc) of their chisels. Chisels range from Rc56 (relatively soft) to Rc64 (relatively hard). Softer steel is easier to sharpen but doesn't hold its edge as long. Steel above Rc62 holds an edge longer but takes longer to hone. It also can be brittle and prone to chipping.



Mortise chisels

These heavy-duty chisels are designed to chop out mortises without any predrilling.

CHOPPING A MORTISE

Lay out the mortise with a mortise gauge and a marking knife. Take a heavy blow with the chisel held plumb, just inside the knife mark (1). The next blow is taken bevel up (2), the waste levered out (3), and the process repeated from the opposite direction. For clearance as the mortise deepens, make the angled blows bevel down. Clean the mortise by levering the tool along the bottom (4). To support the short grain atop the mortise, leave the workpiece long, and trim it later.

Mortise chisels come in several varieties and are generally straight-sided, although some have side bevels for ease in popping out chips. Today's manufacturers often refer to these chisels as "trapezoidal," as the blade looks like a shallow trapezoid when viewed from the working end. All usually are ground with 30° to 40° cutting-edge bevels, because steeper bevels hold their edge better under hard use.

SASH MORTISE CHISELS: FOR LIGHT CHOPPING

The most common mortise chisel, modern sash mortise chisels are medium length for bench use, generally with unhooped handles. They are intended for relatively light work, and originally were used in window construction, joining relatively thin mullions and muntins to heavier frames. There is some confusion in describing both medium and long mortise chisels as sash chisels. Traditionally, window and millwork factories used longer, heavier chisels. Today, the medium-length tools usually are called sash chisels.

REGISTERED MORTISE CHISELS: STRAIGHT, SQUARE SIDES

Some manufacturers call these large chisels "heavy-duty sash mortise chisels." They have heavy blades, square sides, and hooped tang handles for tougher use than many sash chisels can handle. "Registered" simply means that the sides of the blade are perfectly square and parallel with each other, not beveled like many bench chisels or trapezoidal like many bolstered mortise chisels. The square sides are an aid when chopping mortises. Most of the German-made mortise chisels are of this design, as are English "registered" or "shipwright" mortise chisels.

MILLWRIGHT MORTISE CHISELS: AN AMERICAN CLASSIC

Not made since World War II, many were 18 in. long for ease in holding plumb. Always with hooped socket handles, they were designed for factory hands to use making window sashes and other millwork on a rapid, piecework basis. Combined with a heavy mallet, these rigid mortise chisels stood up to heavy use better than any chisel I know of. Millwright chisels are common on the used-tool market (they frequently come up for sale on online auction sites such as eBay) but because of their size and appearance, they often are mistakenly called framing chisels. Timber frames in buildings and ships used much larger mortises than the ⅛-in. through 1-in. widths of these chisels.

ENGLISH BOLSTERED OR PIGSTICKER MORTISE CHISELS

Still made by Ashley Iles, pigstickers commonly are found on the used-tool market. These short and stubby chisels fit easily in a tool chest and have a thick, unhooped, oval tang handle that's designed for heavy striking. The handle is mounted against a disk-shaped guard or bolster to absorb the force of the blow. An incredibly tough chisel, pigstickers have been imported for sale to North American cabinetmakers and finish carpenters since before the 1850s. Many have the advantage of being available in 1⁄16-in. increments.

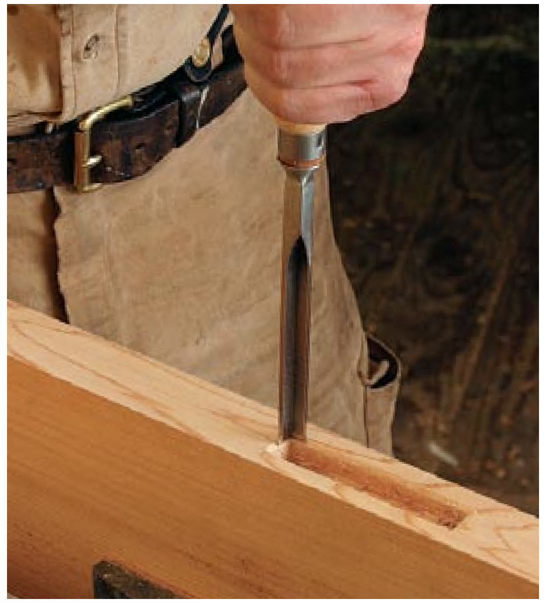
Specialty chisels

These chisels perform specific tasks, generally for advanced craftsmen whose work requires those tasks often enough to justify the purchase of a special tool. Most of the tasks can be performed adequately, but not as efficiently, with common bench and mortise chisels or other tools in the shop.

SKEWED PARING CHISELS
These are thin and skew cut to reach into corners, and usually come with tang handles. Bench chisels are converted easily to skewed parers by regrinding to thin the blades and applying 20° bevels to the cutting edges.

SWAN OR GOOSENECK CHISELS
Designed to deepen or clean up the bottom of a mortise, the gooseneck has a curved blade that functions as a fulcrum, levered against the mortise's sides. Most mortises can be cleaned up just as well with a conventional chisel by anchoring the bevel of the chisel against the mortise end and scraping the bottom. Swan and gooseneck chisels are made primarily for locksets and other mortises too long for that technique.

DOVETAIL CHISELS
Defined by triangular blades with 20° bevels, dovetail chisels are paring chisels with cranked handles designed to reach into sliding dovetails. Another "dovetail" chisel is a bench or paring chisel reground by the craftsman to reach into the spaces between dovetail pins instead of using a skewed parer for that task.

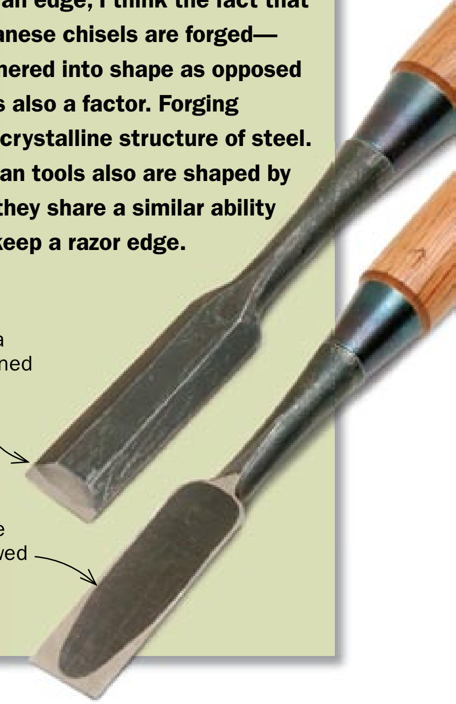


CORNER CHISELS
Once made strictly in large sizes for timber-frame mortises in buildings and ships, corner chisels now are made smaller for cabinetry. Their primary function is to square up mortises that have been drilled first, although that also can be done with conventional chisels.

JAPANESE CHISELS

Hand-forged, best-quality steel is the mainstay of legions of knowledgeable woodworkers who use Japanese tools. Traditional Japanese chisels are forged from a combination of softer steel in the shank and body for toughness, and very hard high-carbon steel for the back, which takes a keen edge. This combination speeds sharpening, as only the cutting edge is of the hardest steel. The backs are hollow ground and can be flattened quickly.

While the steel's hardness certainly helps it take an edge, I think the fact that the best Japanese chisels are forged—that is, hammered into shape as opposed to ground—is also a factor. Forging changes the crystalline structure of steel. Older American tools also are shaped by forging, and they share a similar ability to take and keep a razor edge.



What to buy first

To begin building your set, you certainly don't need anything expensive. A set of beveled-edge bench chisels in ⅛-in. through 1-in. widths and a set of ¼-in., ⅜-in., and ½-in. mortise chisels (sash if you do lighter work; registered, millwright, or bolstered for heavy chopping) can make a lifetime of heirloom furniture and handle most household woodworking projects. That's all I used for most of my working life. Just as astounding as how quickly my mentors' wooden boats went together using mostly hand tools was how few tools those gentlemen owned.

8 Handplanes You Can't Live Without

Do better work with these vital tools

BY GARRETT HACK

Every shop—even one that relies heavily on power tools—needs handplanes.

For some tasks, such as smoothing a surface or fitting a joint perfectly, handplanes fine-tune work that was begun on a machine. In other instances, they handle jobs that machines can't do as quickly or nimbly. Handplanes are quiet, safe, and clean. They encourage working at a slower pace that is less prone to mistakes. And did I mention enjoyment? The swish of a plane across a surface and the smell of fresh shavings are reason enough to pick up a handplane.

To reap these rewards, though, you first have to spend some effort in learning to handle the tools and, most importantly, in learning to keep them sharp. A good guide for sharpening plane irons and other hand tools is David Charlesworth's "Sharper Tools with Waterstones" (pp. 44-49).

The planes on this list are tools that I use day after day. Most do a variety of things very well; a few are the best tools for specialized tasks. I've listed them in rough order of importance.

Garrett Hack makes furniture in Thetford Center, Vt.

1 Bench plane

Best at: Flattening and smoothing surfaces

Model shown: Old Stanley Bedrock No. 604 fitted with a thick replacement blade

Available new: Contemporary versions by Lie-Nielsen, Veritas, Clifton, and others feature unbreakable castings and thick alloy blades (good for chatter-free cutting).

If you have just one plane in your shop, make sure it's a No. 4 bench plane. I use mine all the time to flatten and smooth surfaces or to joint and trim edges in ways that power tools and sandpaper can't.

If you're fitting a drawer front, for instance, the plane lets you dial it in carefully, one 0.001-in.-thick shaving at a time. In contrast, a single mistake on the tablesaw can render the workpiece useless. You'll also find that, with practice, you can use a No. 4 to smooth a fairly large drawer face with a few passes in less than a minute. Unlike a sander, the plane leaves a smooth surface that has deep clarity and is flat right to the edges.

The No. 4 also is great for cutting bevels in a profiled edge and does a respectable job smoothing end grain, like that on the edge of a tabletop. It even works well for shaping convex curves such as a bowed drawer front.

The key to the No. 4's versatility lies in its middle-of-the-road size. It takes a two-handed grip that delivers enough power to flatten and smooth large parts, yet it's small enough to use in tight places or for more delicate work. The blade can be adjusted to take a coarse shaving, or a very fine one that leaves a beautifully smooth surface.

You can tackle both tasks with a single No. 4 plane by opening the throat wide for the rough work, then narrowing the opening for the smoothing passes. For some No. 4s with a "Bedrock" frog, this adjustment takes 15 seconds; with others, the blade must be removed in order to adjust the frog forward and tighten the mouth.

Working a surface. *The No. 4's size makes it ideal for flattening or smoothing a small panel.*

Cleaning up small parts. *A few passes clean up machine marks and put a finish-ready surface on a stile.*

Make fine adjustments. *The No. 4's throat can be closed to take very fine shavings, perfect for precisely fitting parts such as a drawer front.*

2

Adjustable block plane

Best at: Shaping curves and chamfers, smoothing small surfaces, trimming dovetails, and cutting end grain

Model shown: Lie-Nielsen No. 60½

Also available new: Veritas makes a nice version of this low-angle, adjustable-throat plane. Stanley continues to make the classic 60½.

A champ at profiling. *The block plane's small size gives it great flexibility in cutting chamfers or custom rounded profiles.*

This plane, patterned after the Stanley No. 60½, is another tool to keep within easy reach. Like the No. 4, it can be adjusted for rough or fine work, and it does a multitude of things well.

I like this plane for the precise trimming of small surfaces, such as where stile and rail meet on a frame. In similar fashion, I keep the No. 60½ handy when sizing small parts because it can take fine shavings from edges too narrow for larger planes.

For these reasons, the 60½ is perfect for the very exact business of sizing inlays and trimming them flush after glue-up, where the grain might be going in many directions. For the smoothest cutting in these situations, you need a plane with a throat that can be adjusted to the thickness of a piece of thin paper.

The block plane is also the best tool for trimming dovetail pins flush after glue-up. Because the plane cuts at a low angle, much like a paring chisel, it is ideal for cutting end grain smoothly.

This plane is also excellent for shaping wood, giving you great flexibility when cutting tapered chamfers or rounded edges. In contrast to a router setup, the block plane lets you refine or alter a profile easily as you go.

Trim dovetails perfectly flush. *A low-angle block plane can bring the end grain of the pins flush with the surface of a drawer side.*

3

Jointer

Best at: Jointing edges of any length, flattening large surfaces

Model shown: Old Stanley Bedrock No. 607

Available new: Clifton, Stanley, and Lie-Nielsen all make a No. 7.

I rely on the mechanical jointer in my shop every day, but I wouldn't be without my jointer plane. The No. 7 is ideal for jointing edges on boards that are too long, heavy, or awkward to handle on the jointer. I often use it to clean up machine-jointed edges, especially those that will be glued. This is because jointer knives that are slightly dull or improperly set can create a scalloped surface that leaves gaps in the glueline. And that could mean a glue-line that shows or a joint that fails.

The No. 7 perfectly trues the edge and cuts a clean glue surface. I also can use the plane to make an edge slightly concave along its length for a sprung joint.

This plane and its beefier sibling, the No. 8, also are hefty and long enough to make quick work of flattening large surfaces or cutting a set of tapered legs dead straight. The long sole bridges valleys that a No. 4 would follow, making the jointer plane a better choice for flattening.

The accuracy of a jointer plane depends on a sole that is flat from end to end. These planes cost more to make and thus are considerably more expensive than a No. 4. Otherwise, look for the same basic characteristics: comfortable handles, a thick blade, and easy throat adjustment.

Flatten big surfaces. *A jointer, with its long, heavy sole, is perfect for taking heavy shavings needed to flatten wide, roughsawn stock or a glued-up panel.*

4

Shoulder plane

Best at:
Truing up tenon shoulders and trimming tenon cheeks

Model shown:
Stanley No. 93

Also available new: Veritas makes a nice midsize shoulder plane. Others are offered by Lie-Nielsen, Clifton, and Stanley.

I like to say that a perfectly fitted mortise-and-tenon joint looks like it grew together. Even with precise tablesaw tenoning jigs and hollow-chisel mortisers, it's hard to get this sort of fit straight from the machines.

So many things can prevent a joint from fitting perfectly. A tablesaw blade, even with stabilizers, can wobble and cut a shoulder that's not perfectly straight. Or you could wobble when cutting the cheeks (even using a jig). You might have a joint ever so slightly out of square in either plane, in which case one shoulder hits before the other or the bottom hits before the top. The longer the shoulder (breadboard ends being the extreme), the more likely or obvious the problems.

The shoulder plane fixes these slight imperfections, leaving you with a perfectly fitting joint. It can take a fine shaving precisely where you need it, whether on a shoulder or cheek. For slightly angled joints, a shoulder plane is safer than using a tablesaw's miter gauge, where it is very easy to get something backward.

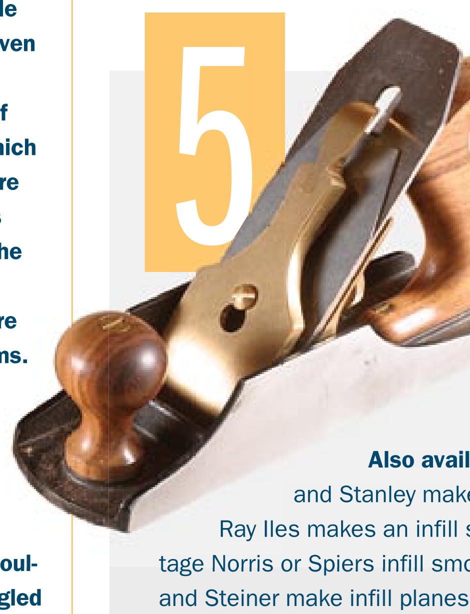
I regularly use my Stanley No. 93 for adjusting rabbets cut by machine, such as on the meeting rails of two cabinet doors or when fitting a rabbeted panel. It also works across the grain in other situations, such as sizing the bottom of a wide dado.

Earning its name. *The shoulder plane's full-width blade and sides that are square to the sole allow it to accurately true up a tenon shoulder.*

Slimming a fat tenon. *The same attributes make it useful for trimming a tenon cheek for a precise fit.*

Ready for a finish. *A well-tuned smoothing plane will leave a glasslike surface that doesn't need sanding.*

5



Smoothing plane

Best at: Cutting a smooth, highly polished surface that is ready for a finish

Model shown:
Lie-Nielsen No. 4½

Also available new: Clifton, Lie-Nielsen, and Stanley make a Bailey pattern No. 4½. Ray Iles makes an infill smoother reproduction. Vintage Norris or Spiers infill smoothers can be found. Sauer and Steiner make infill planes superior to many originals.

Woodworkers smooth lots of surfaces. A smoothing plane is amazingly efficient at this, cutting flat surfaces so polished they shine with deep clarity. A No. 4 is an OK smoother, but it is a little light for really difficult grain. It's more efficient to have a plane dedicated to smoothing. It should have some mass, a super-fine throat, and a solidly supported, thick blade. That No. 4 is still very useful as a pre-smoother, flattening a surface and doing the bulk of the work. That way, the smoothing plane need cut just a few gossamer shavings and stays at peak sharpness longer.

A good smoother may be the most expensive plane on this list, but it's worth it. Among the best designs are heavy British planes such as those made by Norris and Spiers, with steel bodies infilled with dense rosewood, and very thick blades. A number of contemporary versions are available, some better than the originals. The heavy body and wide blade of the No. 4½ make it a very good smoother, especially with a 50° cutting angle (frog). Length is not important for a smoother, but some like the mass of a No. 7, No. 6, or No. 5½ for this work.

Photos: Steve Scott

6 Spokeshave

Best at: Shaping, smoothing, and refining curves

Model shown: Old Stanley No. 52

Available new: Contemporary versions by Veritas, Lie-Nielsen, Woodjoy, and others

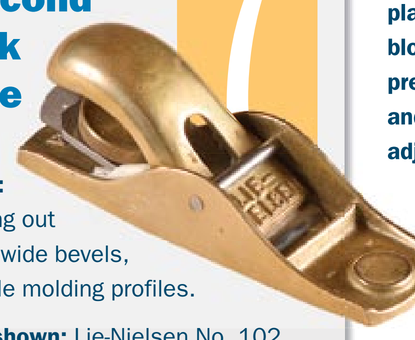
Smoothing an inside curve. *A spokeshave can easily navigate curves like those on this chest apron.*

For the most part, all of the planes listed so far work well to make wood flat, smooth, and square. But what about curves?

For shaping or smoothing curves, nothing beats a spokeshave. The spokeshave, with its narrow sole and winglike handles, doesn't look like a handplane, but it works like one. It holds a relatively wide iron at a fixed angle and depth. It registers the cut against a sole, and it takes a shaving. The spokeshave's long handles and narrow sole are ideal for steering around curves and working into tight places. They help maintain a consistent angle easily when cutting chamfers where a block plane won't reach, such as along a concave curve. The narrow sole allows the tool to work both inside and outside curves. Soles come in a variety of shapes, including rounded for tighter curves. The spokeshave is a great tool for shaping the profile on the edge of a curved tabletop or an arched apron, or for smoothing the bandsawn profile of a cabriole leg.

Chamfering along a curve. *The tool also can be used to cut a chamfer along a tight curve, a tall order for an ordinary handplane.*

7 A second block plane



Best at: Roughing out curves, wide bevels, or simple molding profiles.

Model shown: Lie-Nielsen No. 102

Available new: Your second block plane could be another No. 60½, adjusted to take rougher cuts. Lie-Nielsen's No. 102 fits a large palm well, and its open throat is suited to aggressive work and big shavings.

If you already have a No. 60½ tuned for precise work, you'll find you can work more quickly if you set up a second block plane to make coarser cuts. Having twin block planes ensures that each is tuned precisely the way I want it for the work and spares me the hassle and variation of adjusting a single plane back and forth.

I use this second plane to rough out a wide chamfer or bevel, or to shape a bullnose profile for a cabinet molding. The plane offers good control despite making aggressive cuts. I also use my second block plane, set for a light cut, to remove freshly dried glue from a panel, a far safer bet than risking tearout by scraping it off.

Chamfering a tenon end. *A block plane adjusted for rough cuts makes quick work of many simple tasks.*

Small router plane 8

Best at: Cutting and cleaning up small grooves, cleaning up hinge mortises

Model shown: Old Stanley No. 271

Available new: Lie-Nielsen makes a small router plane (see p. 13) based on this design. It offers a ¼-in. blade as well as pointed- and square-tipped 3/32-in. blades for inlay work.

When working on just a few parts, I often find that to set up a machine to do 100% of a task takes far more time (what with test cuts and jigs) than to do 95% of the job quickly and the rest by hand. A stopped groove for a box bottom is a good example. I can set up a tablesaw with a dado blade in a minute, but it leaves curved ends to be cleaned out. A small router plane is just the tool, with its right-angled blade projecting below the sole and working as a paring chisel. The blade can be locked to cut consistently at any depth. For a long time this was a shopmade tool, with a simple wooden body and a bent chisel blade.

The No. 271 router plane, the pint-sized sibling to the No. 71 router plane, is one of those planes that can make your life a lot easier. It can work in a groove or dado as narrow as ¼ in. wide, and it can work along a curve as easily as a flat surface. For leveling the bottom of an inlay recess, a router plane is far easier to use than a chisel, and less apt to damage the walls. It's also useful for installing drawer locks that mortise into the back of the face, and for cutting hinge mortises at a consistent depth. The No. 271 is worth having for cleaning up stopped dadoes and sliding dovetails alone.

A small job done quickly. *A router plane cuts a hinge mortise to an even depth. Note the strip clamped on for support.*

SOURCES OF SUPPLY

NEW

Modern woodworkers are enjoying something of a plane-making renaissance, with many toolmakers building quality planes. Naturally there are differences in cost, quality, and characteristics of each tool. Generally, Lie-Nielsen planes are the priciest, with a high level of precision and finish on every aspect of the tool. Veritas focuses on performance and innovation, less on a classic look. Clifton's planes are better-made versions of traditional Stanleys, with some tuning required. Specialty makers are in a class by themselves, with beautiful, high-performance tools for an equally high price.

HIGHLAND WOODWORKING
800-241-6748
www.highlandwoodworking.com
Anant, Clifton, Lie-Nielsen, Stanley

LIE-NIELSEN
800-327-2520
www.lie-nielsen.com

SAUER & STEINER TOOLWORKS
519-568-8159
www.sauerandsteiner.com

TOOLS FOR WORKING WOOD
800-426-4613
www.toolsforworkingwood.com
Clifton, Ray Iles

VERITAS
800-871-8158
www.leevalley.com

USED

Used tools are another choice, often the least expensive and needing plenty of tuning, but usually worth it—especially for the frugal among us. And there is no denying the special satisfaction that comes from reviving an old tool. If you have the time and energy, flea markets and yard sales can yield a great many tools for far less than the cost of new ones. Used-tool dealers, online auctions, and tool collectors' meets are other good venues for scouting out a bargain.

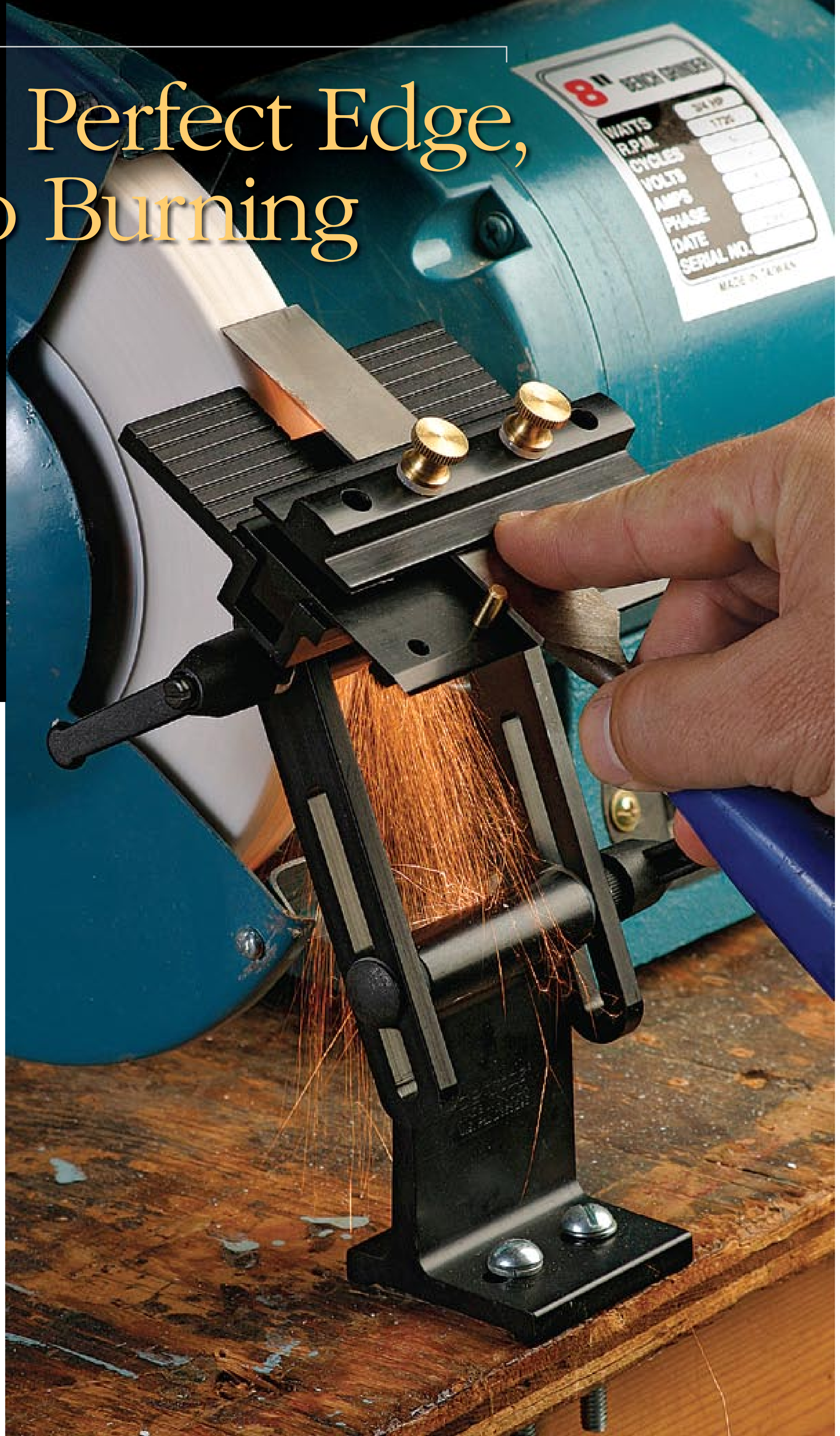
Online Extra

In 8 short videos, esteemed furniture maker and teacher Philip C. Lowe answers readers' questions about handplanes, from sharpening to blade repair, easing chatter, and more. Go to **FineWoodworking.com/HTextras.**

Grind a Perfect Edge, with No Burning

Before honing, you'll need a clean bevel. Here's how to get one quickly

BY CHRIS GOCHNOUR



Sharpening is a process, and it includes two main steps: shaping the edge, and honing it. Although final honing is what determines true sharpness, it won't go very well without a clean, straight bevel to start with. There are a number of ways to use rough abrasives to shape steel and fashion a fresh bevel, but the bench grinder is the most efficient tool for the job.

For years, woodworkers were afraid to grind their edges because the old gray wheels, moving at very high speeds, tended to burn tool edges, removing their hardness. But then "friable" grinding wheels came along. These aluminum-oxide wheels are more efficient for grinding because the individual grits tend to fracture easily, revealing new, sharp edges. I recommend a 60-grit wheel. Together with slower-speed grinders, these new wheels have made grinding much friendlier to tool edges.

Keep the wheels dressed. *Replace your old gray wheel with an aluminum-oxide wheel, and use a dressing stone to periodically resurface it. In addition, Gochnour finds it helpful to bevel the corners of the wheel.*

Start with a flat nose. *Gochnour grinds a square nose at the cutting edge. Then, after resetting the tool rest to grind a new bevel, he periodically checks the disappearing blunt edge to be sure he is grinding evenly.*

I've learned a few other grinding tips over the years. Even though most of them fall into the category of common sense, they are all helpful when I'm at the wheel.

• Dress the wheel periodically to expose a fresh grinding surface and to keep it running straight and true. One option is to use a dressing stone freehand or mounted in a tool guide. I also use an industrial diamond set in the end of a steel rod, with the rod mounted in a tool guide. With the tool rest angled 5° below the axis to the wheel, I move the diamond point back and forth across the wheel to expose fresh, sharp abrasive particles quickly. Another good idea is to bevel the edges of the grinding wheels. This helps minimize the chance of overheating a tool as you engage the grinding wheel from the side.

• Use a light touch to keep things cool. If you apply too much force to the tool in an effort to speed up the grinding process, the tool steel may overheat and cause the cutting edge to lose hardness. When using the proper grinding technique, you should be able to grind a tool without having to cool its cutting edge in a water bath. That said, I keep water close at hand when I'm grinding, for those occasions when I feel the edge getting hot.

• I first create a small, flat, blunt nose on the edge using an abrasive sander, a coarse benchstone, or the grinder. I use the flat as a reference while grinding, working until the flat almost disappears uniformly across the cutting edge. I don't grind all the way to a feather edge because the blade is more prone to overheating, plus the reference flat is lost. The extremely thin, blunt area that remains is eliminated easily during the honing phase of the sharpening process. □

Use a light touch. *Too much pressure while grinding will cause the steel to heat up and lose hardness. If you feel heat building, dip the tool in water to cool the edge.*

Chris Gochnour builds furniture in Murray, Utah, and teaches woodworking around the country.

A GOOD TOOL REST MAKES THE JOB EASIER

www.leevalley.com
Tool rest, tool guide, and bevel-setting gauge: $69

AUTHOR'S BEST VALUE CHOICE

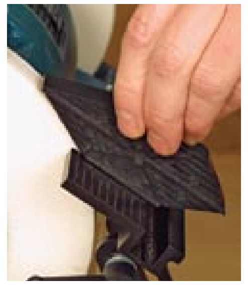
AUTHOR'S BEST OVERALL CHOICE

A broad, easily adjustable tool rest is essential for grinding woodworking tools. And the tiny tool rests that come with most bench grinders are just not up to the job.

The last time we tested aftermarket tool rests, this Veritas model was the clear winner. Its base is bolted to the work surface, and adjustable handles made it relatively easy to lock the large platform securely in any position. The tool rest comes with a molded-plastic gauge that is used to quickly set the platform to common grinding angles. The platform can be used to grind tools freehand, but it includes a lengthwise groove designed to accept the Veritas tool guide, also called a grinding jig. Any cutting tool can be held between the clamping bar and the deck of the tool guide for sharpening. A pair of knurled brass knobs provides all the clamping force needed. A brass alignment pin made it easy to register the blade of the tool at 90° (for most applications) or at 30° (for grinding skew chisels).

In use, the Veritas proved to be easy to set up and adjust. It excelled when grinding plane blades and chisels.

—C.G.



Gauge sets bevel angle. *Setting the bevel angle on the Veritas is easy, thanks to a simple gauge that comes with the tool rest.*

Photos, except where noted: Tom Begnal; facing page: Michael Pekovich

Sharper Tools with Waterstones

There's no faster or more economical way to obtain razor-sharp tools

BY DAVID CHARLESWORTH

WATERSTONE SHARPENING KIT

To get and maintain razor-sharp cutting edges, you will need an 800- and a 1,200-grit waterstone and a plastic food container to store them wet. The 8,000-grit stone is stored dry, then misted with water and rubbed with a small Nagura stone to create a slurry prior to use. A rubber mat stops the stones from slipping.

Sharpness is a function of two polished surfaces meeting to form a cutting edge. The easier and quicker it is to polish these edges, the more likely you are to keep your tools sharp, and sharper tools will raise the quality of your woodworking projects.

My preferred method of sharpening is to use Japanese synthetic waterstones, and I recommend them to my students. They cut faster and give a better edge than most other sharpening systems. The grit size of an 8,000-grit stone is about 3 microns, meaning that it leaves scratches no more than 1.5 microns deep. This is a much better polish than you get with alternatives such as translucent Arkansas, ceramic, or diamond stones.

The cost of a set of synthetic stones is less than that of most other sharpening systems. A basic set of stones—800 grit, 1,200 grit, and 6,000 grit with a Nagura honing stone—costs around $75. Substitute an 8,000-grit stone for a slightly finer polish, and the cost is still well under $100.

To get the best from these stones, a disciplined approach to both using and maintaining them is essential. I have developed a time-tested method for sharpening that requires minimal effort.

A sharpening and storage station

I store the coarser 800-grit and 1,200-grit stones on their sides in plastic trays of shallow water. A dash of household bleach can be added to the water to slow the

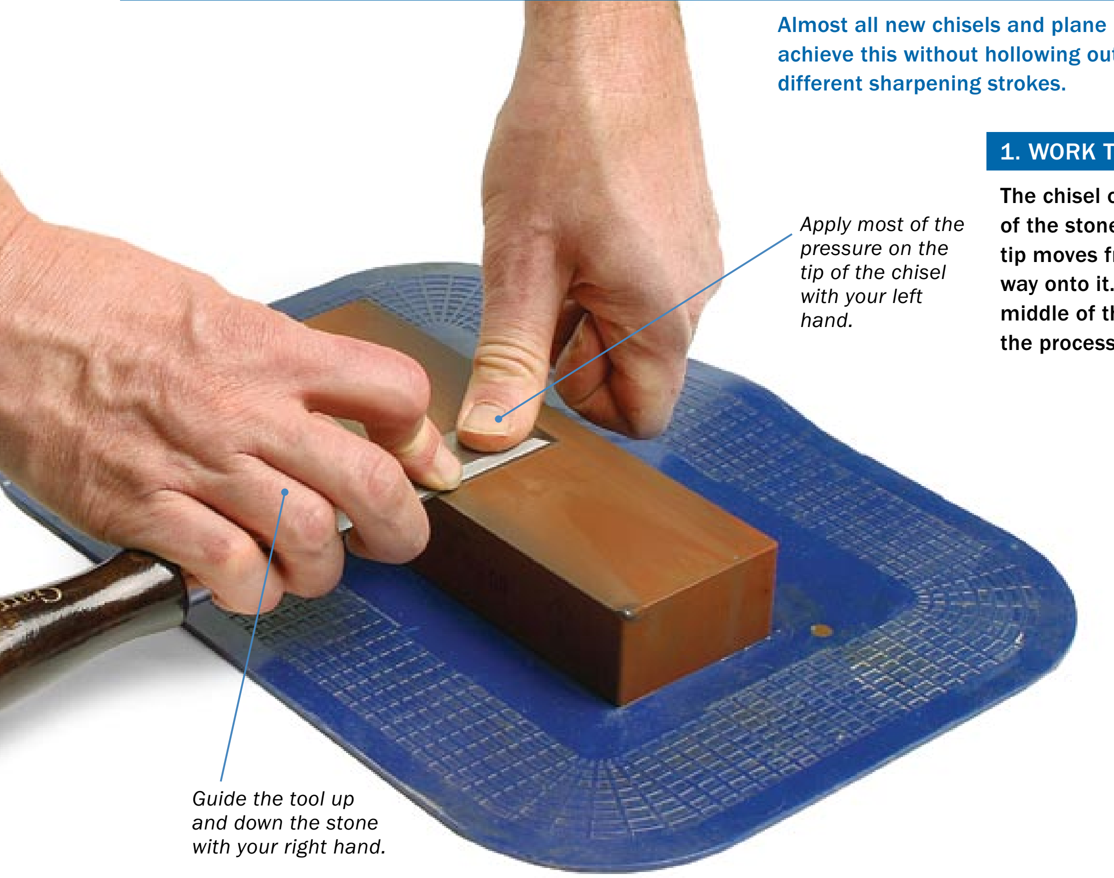
FLATTEN THE STONE BEFORE SHARPENING

Mark the surface of the stone with a pencil. Then place a sheet of 240-grit wet-or-dry sandpaper that has been soaked in water onto a piece of ½-in.-thick glass. Keep abrading the face of the stone until all of the pencil lines have been removed, indicating that the surface is perfectly flat. After flattening the stone, ease the edges slightly.

Photos: Mark Schofield

Flatten the back of the tool

Almost all new chisels and plane irons need to have their backs flattened. To achieve this without hollowing out the waterstones, Charlesworth employs two different sharpening strokes.

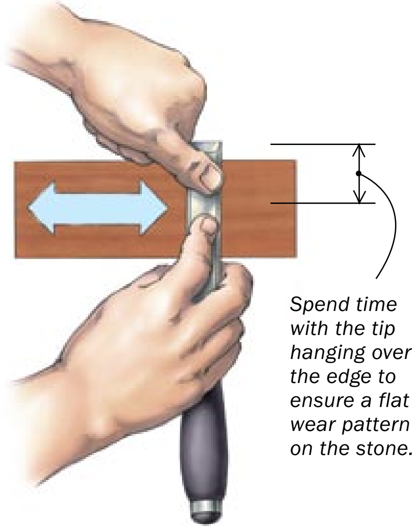


Apply most of the pressure on the tip of the chisel with your left hand.

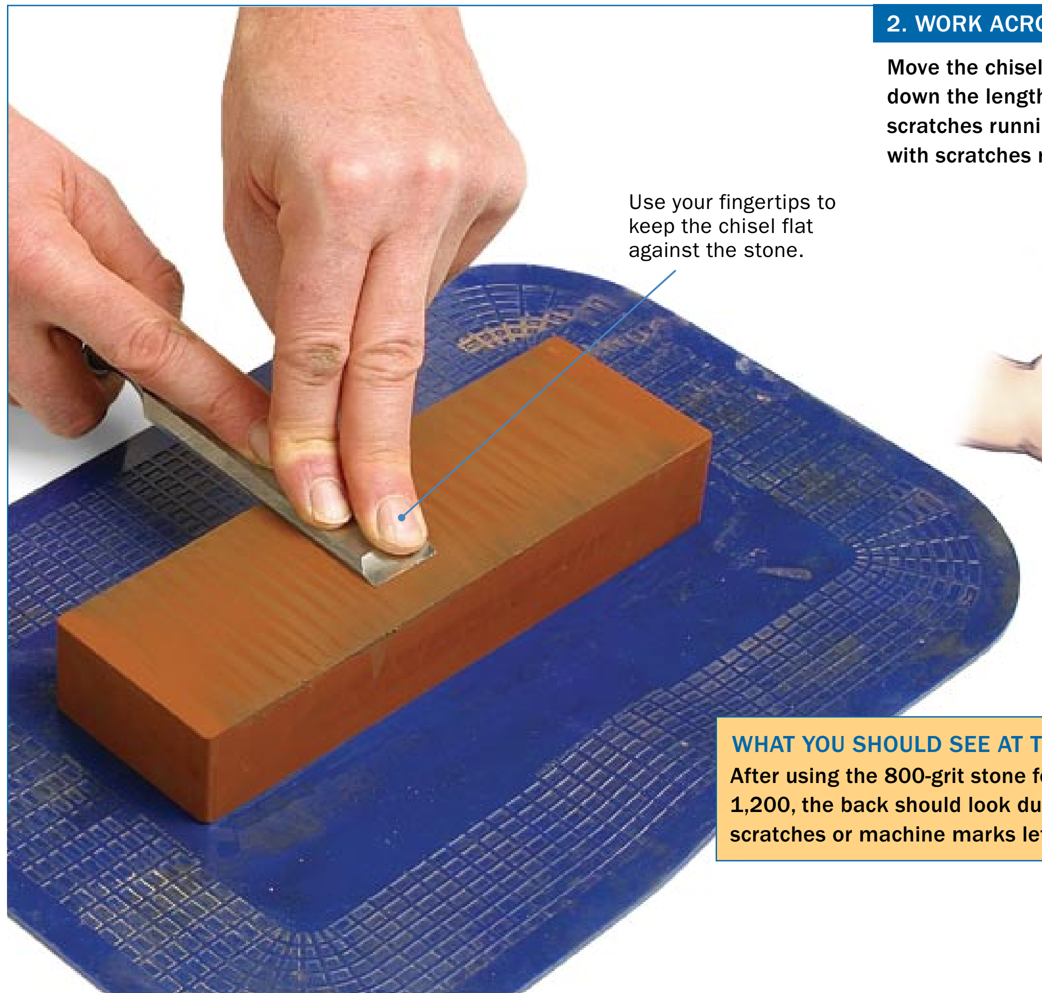
Guide the tool up and down the stone with your right hand.

1. WORK THE LENGTH OF THE STONE

The chisel or plane iron is moved up and down the length of the stone. Over the course of about 10 strokes, the tip moves from ½ in. off the stone to one-third of the way onto it. With this technique, you avoid hollowing the middle of the stone. Rotate the stone 180° and repeat the process.



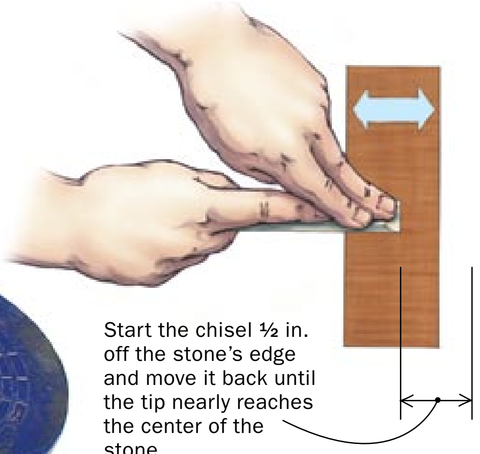
Spend time with the tip hanging over the edge to ensure a flat wear pattern on the stone.



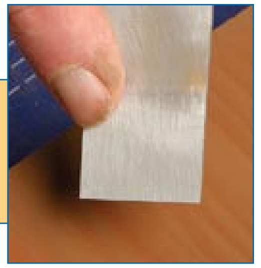
Use your fingertips to keep the chisel flat against the stone.

2. WORK ACROSS THE STONE

Move the chisel back and forth, gradually working down the length of the stone. This will replace scratches running across the back of the chisel with scratches running the length of the back.



Start the chisel ½ in. off the stone's edge and move it back until the tip nearly reaches the center of the stone.



WHAT YOU SHOULD SEE AT THIS POINT

After using the 800-grit stone followed by the 1,200, the back should look dull, with no deep scratches or machine marks left near the edge.

Drawings: Chuck Lockhart

growth of mold. Don't store your stones in water if your workshop freezes at night, because they will shatter. Stones stored dry will be ready to use after a five-minute soak. Stones of 4,000 grit and finer always are stored dry and sprayed with water only prior to use.

My sharpening station also includes a simple stone-flattening device: ½-in.-thick float glass attached to a Corian base that drains the sludge back into the sink.

Storing waterstones

Coarser (800- and 1,200-grit) stones are stored on their sides with water just above the lower edge of the stones. Stones of 4,000 grit and finer are stored dry and sprayed with water just before use.

Controlling the stone's wear

Because waterstones are designed to erode with use, in the hands of the inexperienced they quickly can develop a hollow profile. My sharpening technique minimizes hollowing, which is particularly helpful when flattening the backs of new plane and chisel blades.

Lengthwise flattening—There are two types of stroke, the lengthwise stroke and the crosswise stroke, which refer to the orientation of the stone rather than the blade. Lay the blade across the 800-grit stone with its edge about ½ in. off the left edge of the stone. (Left-handed readers, please substitute left for right in these directions.) Apply heavy pressure with your left hand just behind the grinding bevel, and gently grip the neck of the chisel with your right hand to stop it from pivoting. Use a full-length stroke to and fro, pausing just before either end of the stone.

As you work the chisel up and down the stone, allow the edge of the chisel to travel slowly to the right until it is one-third of the way across the width of the stone. When the chisel's tip reaches this point, allow it to drift back to its starting point, with the tip off the left side of the stone. The cycle then begins again. It takes about 10 strokes to and fro, traveling to the right and then back to the left.

By ensuring that the chisel tip spends 50% of its time off the left edge of the stone, the stone will wear slightly convex in its width, making it impossible to create a hollow in the width of the stone. The left edge will be worn slightly hollow in its length, but more on that later. After about 50 full-length strokes to and fro, rotate the stone 180° to work its other edge.

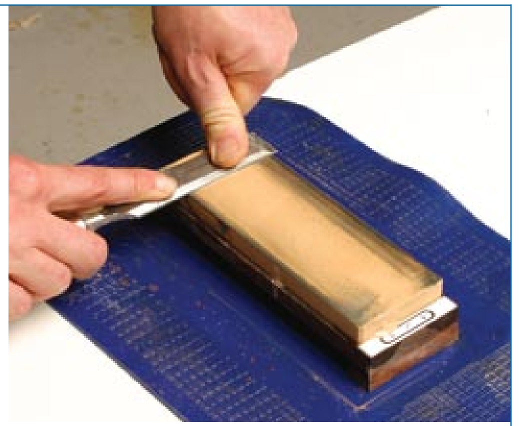
After 100 strokes, it's time to flatten the stone

Flattening is done with 180-grit or 240-grit wet-or-dry sandpaper stuck to the glass by water surface tension. New waterstones should be flattened before use. Mark a grid of pencil lines on the surface. By watching the grid change during flattening, you will be able to interpret exactly how the surface wore during honing. When all trace of this grid is gone, your stone is dead flat. Ease the soft edges to prevent them from crumbling in use.

Crosswise flattening—Relying on only lengthwise grinding could cause wide chisels and plane blades to become

3. REPEAT THE PROCESS ON THE FINE STONE

Before using the 8,000-grit stone, spray water on it and rub the surface with a Nagura. This speeds up sharpening by creating a slurry.



Polish the back. *The same two types of strokes that were used on the coarser stones are used on the 8,000-grit stone. The aim is to keep the back flat while polishing the area behind the tip of the blade.*

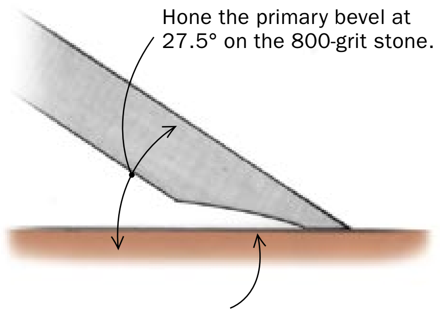
A PROPERLY FLATTENED BACK

The back of the chisel should have a nice polish and an even scratch pattern at the tip—within ½ in. of the front edge.

SHARPENING WITH WATERSTONES | Hone the bevel

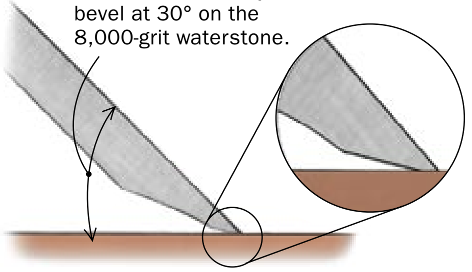
1. HONE THE PRIMARY BEVEL ON THE 800-GRIT STONE

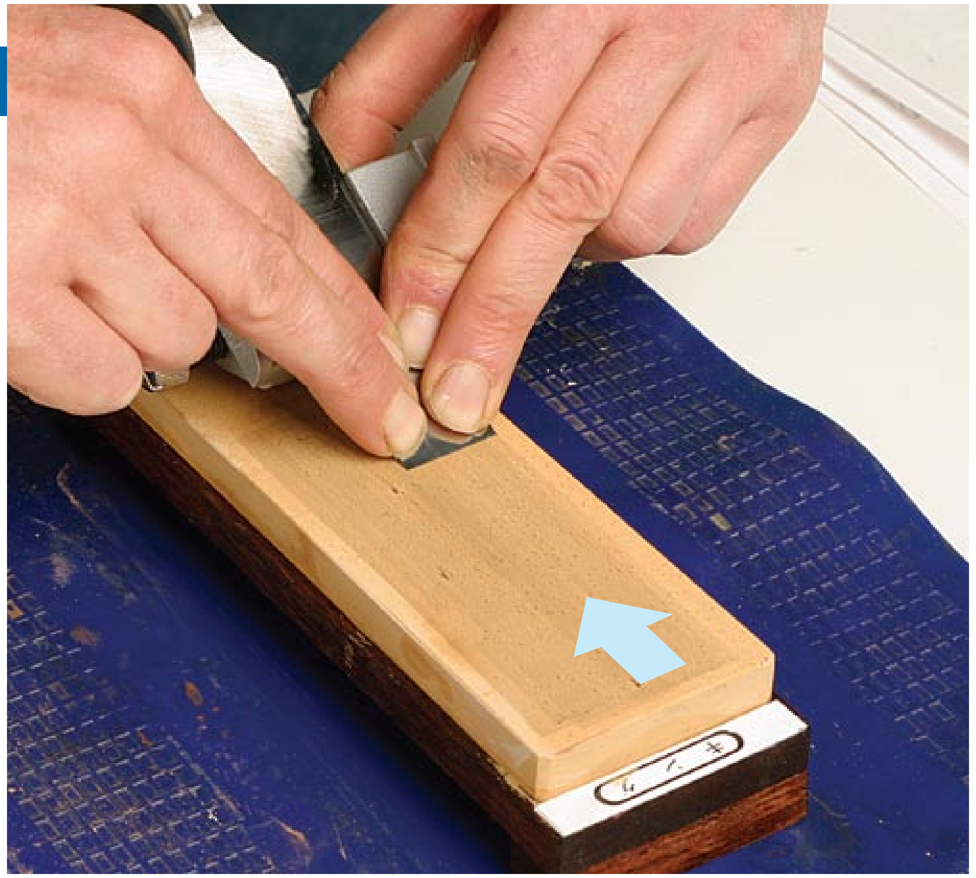
Set the bevel angle. *With the chisel mounted in a honing guide, line it up against a shopmade angle finder to establish the desired angle for honing a bevel on the 800-grit stone.*



2. HONE THE SECONDARY BEVEL ON THE 8,000-GRIT STONE

Reset the honing guide. *To achieve the angle for this tiny bevel, withdraw the tip of the chisel about 1/8 in.*





A few light strokes. *Establishing the final cutting angle on the 8,000-grit stone requires only three or four light pulls.*

Remove the wire edge. *Pull the back of the chisel onto the 8,000-grit stone a couple of times to roll this thin burr around, and then make a few crosswise passes to remove it.*

convex in their width. The crosswise grinding stroke is much shorter and across the stone: The chisel tip starts off the stone and moves to a point one-third to halfway across its width. Gradually work down the length of the stone and back again; then rotate the stone 180° and use the other half of the face. When this is done, flatten the stone again and repeat the first type of stroke.

The scratch patterns on the chisel's back from these two different strokes will be at right angles to each other. If you watch how the first crosswise ones are replaced gradually by the lengthwise scratches, you will be able to see whether the back of the blade is flat.

Your objective is to remove the manufacturer's grinding marks adjacent to the tool's cutting edge. Depending on the quality of this grinding, you may have to repeat the cycle several times. A badly convex blade (which should have been rejected at purchase) could take an hour or two, while a well-ground blade might take only 20 minutes. You are done when at least the first 1/2 in. behind the tip of the chisel has uniform lengthwise scratches from the 800-grit stone. By the way, for 1/4-in. and narrower chisels, use the crosswise strokes only. Lengthwise strokes may rock the chisel and make it convex in its width.

This sharpening method creates a slight hollow in the length of the chisel's back. This hollow might amount to 1/64 in. over the length of a Western chisel. The idea of a hollow in the length of the blade bothers many people, but I prefer it. Indeed, I was trained to look for chisels that had this feature and to reject any with a bellied (convex) back.

Work your way up to the finer-grit stones—Follow an identical sequence on the 1,200-grit stone. This should not take long, perhaps 10 minutes, as the main flattening work was done on the 800-grit stone. Always finish with the crosswise (second) stroke before moving to a finer stone, as this ensures flatness of the width of the back. When the 800-grit scratches are gone, move to the 8,000-grit stone.

Before using this stone, spray it lightly with water from a plant sprayer or flick a few drops of water on the surface. Then, with a Nagura, a small chalky block, rub the surface of the 8,000-grit stone in small circles to work up a little slurry.

Use the two types of strokes as before, and exploit the slight hollow in the chisel's back. With a slightly hollow back, the area of the blade adjacent to the edge polishes almost immediately. Another advantage is that on subsequent sharpenings, a small amount of metal will be removed from this critical area. I can see no reason to polish any other part of the blade except this vital area adjacent to the tip, which forms half of the cutting edge.

Sharpening the bevel side

Compared to flattening the back side of the chisel, sharpening the bevel side is easy and fast. Decide what finishing angle will suit the type of timber and the work being done; 30° is suitable for general chisel work. First, I perform the main grinding on a wet grinder, selecting an angle of about 23° in this case. Precise angles are not important. There is no need to let the grinding surface meet the sharp edge of the chisel unless it is badly chipped or way out of square. I usually aim for about 1/32 in. to 1/64 in. away.

On the waterstones, I use a honing guide whenever possible; I like the cheap Far Eastern copy of the Eclipse model. I recommend using only a pull stroke, as this reduces the risk of digging into the soft surface of the stone.

For sharpening, I set an angle of 27.5° using a shopmade angle-setting guide, and raise a small wire edge, or burr, on an 800-grit stone. With a well-positioned bench light, you can see this edge as it forms. By withdrawing the chisel about 1/8 in. into the guide, the cutting angle is increased to 30° to create a secondary bevel. This has the advantage of making future touch-up sharpenings much quicker, as very little metal must be removed. Three or four light pull strokes are made on the 8,000-grit stone after spraying and preparing a slurry with the Nagura. I do mean very light pressure; remember, this is a polishing stone and not a big remover of metal.

The final stage is to repeat the last step of back flattening with just a dozen or so strokes of the crosswise type to pull the wire edge around and remove it. Future touch-up sharpenings take me no more than about four minutes. □

David Charlesworth teaches woodworking at his shop on the north Devon coast of England.

SOURCES OF SUPPLY

SYNTHETIC WATERSTONES AND HONING GUIDES

HIGHLAND WOODWORKING
www.highlandwoodworking.com

JAPAN WOODWORKER
www.japanwoodworker.com

WOODCRAFT
www.woodcraft.com

NONSTICK MATS

Dycem mats can be bought online at www.alimed.com.

WHAT TO LOOK FOR

The initial grind, the primary bevel, and the secondary bevel all should be defined clearly with no scratches or wire edge left along the chisel's edge.

Get a Grip

Simple and efficient solutions for keeping your work steady

BY GARRETT HACK

A good workbench is one of the most important tools in any shop. It doesn't need to be fancy or have vises to be useful, just a nice, flat work surface and a base sturdy and heavy enough to stay put. The challenge then becomes how to hold your work securely and easily, so you can concentrate on controlling your tools, not the workpiece.

Furniture parts come in a huge variety of sizes and shapes. Take, for example, a chair. To plane the straight seat rails, you must hold them flat on a workbench. To shoot their edges, you need to support them upright. To shape back legs that are curved, you need a different solution, as you might for carving the crest rail or holding any of these parts when chopping mortises.

Fortunately, for every kind of holding problem, there are at least a few solutions: stops, holdfasts, bench hooks, miter blocks, clamps, and more. The best are quick, positive, and easily put to work.

Stops are quick and simple

In an average day, I plane all sorts of parts held flat on my bench. Some are narrow, some wide, some long, and some short. By far the simplest way to hold them (and plenty of other pieces that aren't flat) is to use a single, solid stop of some kind.

I use wood stops because they are easy to customize for holding an odd-shaped part, and they won't damage my tools if I happen to run into one. The stop I use most often is a simple hardwood benchdog dropped into one of the holes on my benchtop. While this gives me flexibility in positioning a workpiece along the bench, a fixed stop either mortised into the benchtop or securely screwed to it can be just as useful.

It's ideal to be able to adjust the height of a benchdog barely above the surface for planing thin drawer sides or sticking out a few inches for larger work. If you mortise a benchdog into your bench, fit it snugly so that it requires only a tap to move it up or down. Because I often move my benchdogs, I've fitted them with ash springs that keep them in their holes. Lee Valley makes similar brass dogs that drop into round holes easily drilled into a bench.

I can adapt a new wooden stop to fit almost any need, such as cutting a V-groove into the face to hold parts with mitered ends. I have a dog with a brad in the face that pricks into small pieces to hold them better. But a stop with a nice, square face is still the most useful, and a little planing dresses it up when it gets worn.

There are times when a single stop does not provide enough support, such as when planing wide stock aggressively. In this case I use a benchdog and clamp an additional stop to my bench to prevent sideways

BENCH DOGS

Made of ash, oak, or similar hardwood, a benchdog is easy to make, and replace as necessary. A wood spring helps hold it in place.

Planing against a single point. *The easiest way to hold a board when planing is to use a single benchdog.*

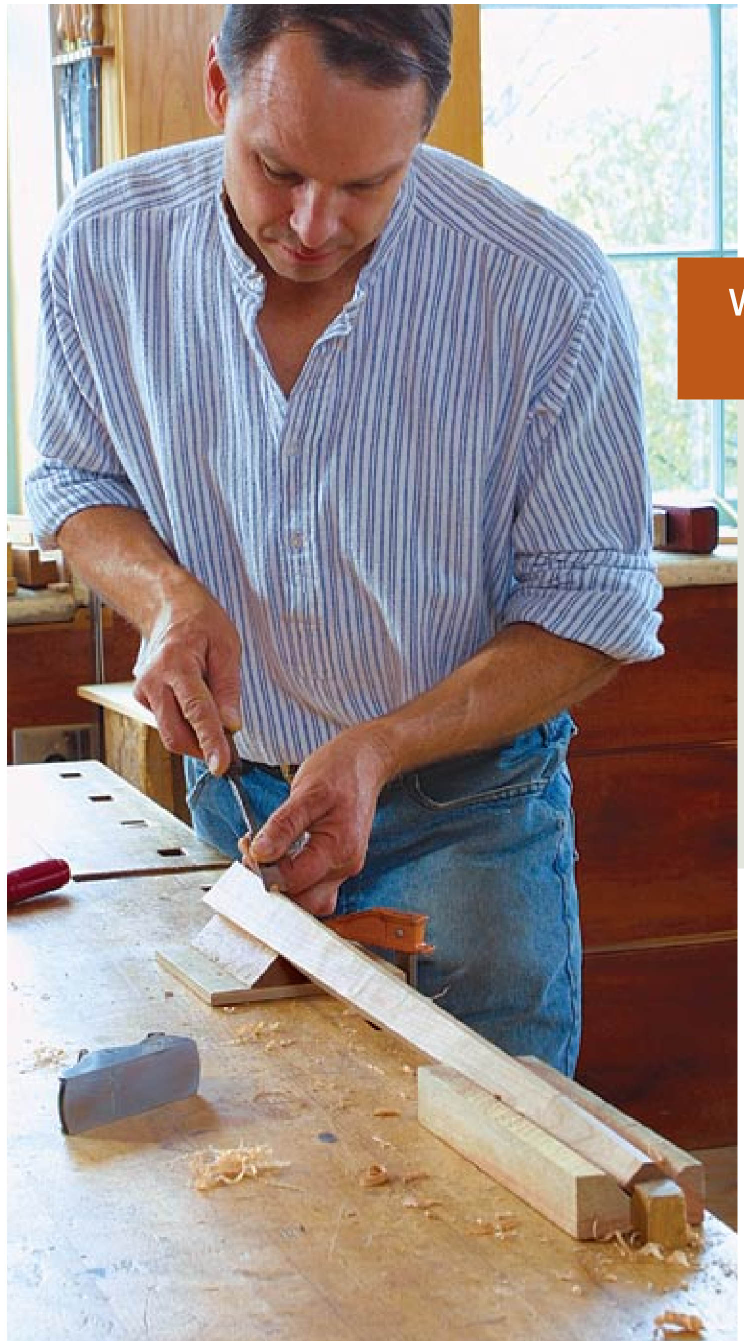
Use two points of pressure with wide stock. *Multiple stops help keep wider stock from moving sideways during planing.*

STOPS FOR THIN WORK

For thin work, a quick, simple jig can hold the stock for planing. Small brass pins (or tacks) can also hold thin stock in place.

Planing thin, straight stock. *This jig is simply a piece of plywood with thin, perpendicular fences. Butt the jig against a benchdog to hold it in place.*

Planing thin, curved stock. *A brass escutcheon pin tacked into a flat board serves as a ministop for smaller workpieces. Because brass is soft, it won't damage your tools if you run into it.*



VERSATILE BLOCKS

To chamfer or put a lamb's tongue on a square leg, make two blocks with a deep V-cut and place one against a benchdog. The blocks hold the legs in the best position for working the corners with a chisel.

Photos: Michael Pekovich

HOLDFASTS

One smack, and the work is secured. The shaft of a holdfast wedges into a hole in the workbench. Be sure your benchtop is at least 1½ in. thick or the holdfast may split the top.

***Odd shapes are no problem.** A holdfast and a stop are all that's needed to hold this burl because it has a flat bottom. If your work doesn't have a flat bottom, use wedges to level the piece.*

movement (see bottom-right photo, p. 50). Or I clamp a board across the entire end to work against.

Stops for thin work—To plane thin stock, I set up a jig that's simply a flat piece of plywood with thin pieces of wood tacked down to it. One piece of wood acts as a stop; the other piece acts as a fence (see top left photo, p. 51). The whole assembly is butted against a benchdog on my bench.

To plane a piece that is curved and very thin, I tack a small brass escutcheon pin on a flat board and butt the piece against it. Brass is a soft metal and will cause less damage to a plane blade if it hits the pin.

Bird's-mouth stops—Planing a board on edge is a common-enough task that it's worth making either of two simple wooden jigs to hold the board securely. One is a thick board with a bird's mouth cut into the end that is clamped to the bench. It also offers some vertical support. A slightly more elaborate version has a wedge to lock the part in place.

To plane a short apron, I butt the piece against a bird's-mouth stop and use a hand alongside the plane to steady both the apron and the plane. This technique is simple, quick, and with practice, not difficult. Where I want a little more support, say, for a thin board, I clamp the end away from the stop in a wood hand screw laid flat on the bench. I've held longer boards in two or three such hand screws.

Stops for curved work—Much of the furniture I build has curved parts. For shallow curves, I can hold the part on the bench as I would a flat piece. When shooting edges, for example, I butt the workpiece against a stop and work carefully to keep the piece balanced and steady. For more shapely parts that don't balance easily against a stop—the curved apron of a demilune table, for example—I use a stop with one or more support boards clamped to my bench (see photo, below right).

Holdfasts—what's out there

Most of the traditional holdfasts come in two sizes: 5 in. and 8 in. The smaller models can hold stock up to 1 in. thick. Choose a larger model for use with thicker or irregular stock.

Newer holdfasts incorporate a screw at the top of the arm. These holdfasts are not hit with a mallet. By tightening the screw, the shaft wedges within a hole drilled into a benchtop. Veritas has a model similar to the classic Record, and the shaft has scalelike rings on it that hold it in the hole.

Jorgensen has a plastic holdfast that is essentially a large plastic screw with an arm. It has a hefty plastic nut that goes under the bench and requires you to reach under your bench to release it. Its arm reach is about 3 in., but the plastic will save the edges of your chisels and gouges.

Beware of holdfasts made from cast iron because the shafts are brittle and can crack and break under stress. The material of a holdfast should have some flex to it. Some of the cast-iron varieties are being redesigned with a steel shank. Most of these holdfasts are made in Taiwan, and while they're pretty rough looking, they will do the job. Woodcraft now sells a U.S. version with ductile iron, which is less brittle than cast steel.

—FWW staff

***Four holdfasts on the market.** Pictured, from left: Jorgensen 1652 Hold Down ($15 per pair); Woodcraft small ($12) and large ($23) traditional holdfasts; Veritas Hold-Down ($69).*

Holdfasts provide a quick, tight hold

A holdfast is simply an upside-down L-shaped bar that wedges into a hole in the bench with a slight rap on the top. Rap a few more times for firmer downward pressure, or from behind to loosen it. Use holdfasts to hold work of almost any shape flat on the bench (flattening out any bow as well). They also can be driven into holes in the front of a bench for holding long boards and wide panels upright.

A holdfast offers quick and secure clamping pressure. The more you drive the holdfast into the hole in the bench, the more tightly it wedges in. A light rap from behind with a wooden mallet quickly releases the clamping pressure. With a model that has a screw on top, insert the holdfast into its hole, place it on the work, and tighten the screw until snug.

If lateral pressure is placed on the workpiece, a holdfast may come loose. Often, using a holdfast together with a benchdog is one of the fastest ways to keep your work in place. I try to use the holdfast to steady the work and then work against the dog.

Installing a traditional holdfast requires a few holes in your bench 1/16 in. larger than the diameter of the shaft. The problem is where to drill the holes without turning your bench into Swiss cheese—and getting past the emotional hurdle of actually drilling those holes. I suggest at least three evenly spaced holes 14 in. to 18 in. from the front of the bench.

Clamps can do the rest

I use both light-duty bar clamps and heavier ones with a jaw reach of about 5 in. Unless the piece is small, two clamps always hold more securely than one; both hold the piece in place and work together to prevent slippage from side to side.

CREATIVE CLAMPING

To secure irregular shapes, use clamps in unconventional ways and combine them with vises, stops, or other clamps.

***Hold turned legs with a bar clamp.** Glue small blocks with protruding nails onto the jaws of the clamp.*

***Wood hand screw can be a vise.** To hold long, unwieldy stock on edge, use a hand screw clamped to the bench.*

***Tenon shaping on curved work.** Use two wedges plus a clamp to keep the piece in place. If the larger block wants to move, place a benchdog behind it.*

Clamps can be the best method to hold work on top of the bench: irregular shapes, large work such as big tabletops, or jigs for specially shaped pieces. By placing the clamps along the sides or back of my bench, I get them out of the way of my prime work surface along the front edge. I try to make jigs large enough to get the clamps well out of the way. Clamps also have better holding power if spread far apart. Whenever possible, I use a benchdog as a stop somewhere along the bench and eliminate one clamp.

I respect my bench, but it's not precious. Drill a few holes in your bench if need be, and set yourself up with a dog, clamps, holdfasts, or whatever. A simple, secure hold-down allows you to do better, safer, more enjoyable work. □

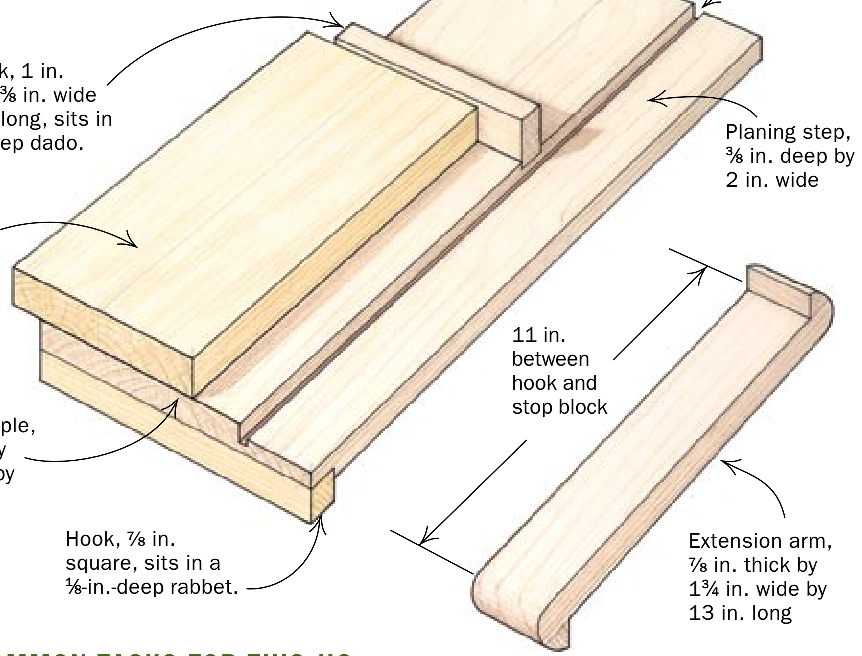
Garrett Hack makes furniture in Thetford Center, Vt.

Bench hooks are indispensable

BY CHRIS GOCHNOUR

A VERSATILE VERSION

This bench hook excels at holding stock when crosscutting as well as handplaning. An extension arm adds support for long stock, and an auxiliary deck can be used for planing thin stock.



THREE COMMON TASKS FOR THIS JIG

Sawing and surfacing. *The bench hook makes it easy to saw the shoulder on a tenon (above). A solid-maple shim reduces the height of the stop block to accommodate thin stock (below).*

Squaring. *The step on the edge of the bench hook guides a bench plane for trimming an end flat and square.*

In its simplest form, the bench hook is a platform that can be held steady against a workbench for tasks such as crosscutting and handplaning. A hook on the underside of the platform fits over the edge of the bench and keeps the platform steady as forward pressure is applied. A stop block on top of the platform, perpendicular to the edge of the bench hook, supports the work.

The bench hook I favor expands on this basic design. On the right side of the platform, I cut a wide rabbet that serves two functions: First, it protects my workbench from damage when I use the jig to crosscut material with a backsaw. Second, it guides a handplane when the bench hook is used as a shooting board. I use this feature often to square and true up end grain after crosscutting.

The bench hook is handy for working tenon shoulders and cheeks, but I get further use from it with a thick auxiliary platform, which raises the surface to about ⅛ in. below the stop block. In this configuration I can plane small, thin pieces such as loose tenons or splines. I have a second, narrow hook, which I use with the standard bench hook to steady long stock.

I cut dadoes in the platform where the hook and the stop block attach, to ensure that they hold steady and remain perpendicular to the edge.

TWO BENCH HOOKS FOR MITERS

I prefer to cut and fit small bits of molding right at the bench. I've found it to be the safest, most precise way to handle small and fragile pieces of molding. To make perfect miters consistently, I use a pair of bench hooks: a miter block for rough-cutting, and a miter shooting board for fine-tuning.

There's only one secret to the miter block, and that's setting the 45° kerfs in the fence to guide a backsaw. Lay out the kerfs with pencil lines and cut them by hand with the same backsaw

Rough-cut miters. *The miter-block bench hook is convenient for cutting small pieces of trim or molding.*

you'll to use to cut miters.

Sawn cuts are a bit rough. So I use a second bench hook—a miter shooting board—to plane miters to a perfect 45°. I made mine from Baltic-birch plywood, which is relatively stable. I glued a strip of hardwood in the location of the planing step, which allows me to true up the jig after construction without using a handplane on plywood.

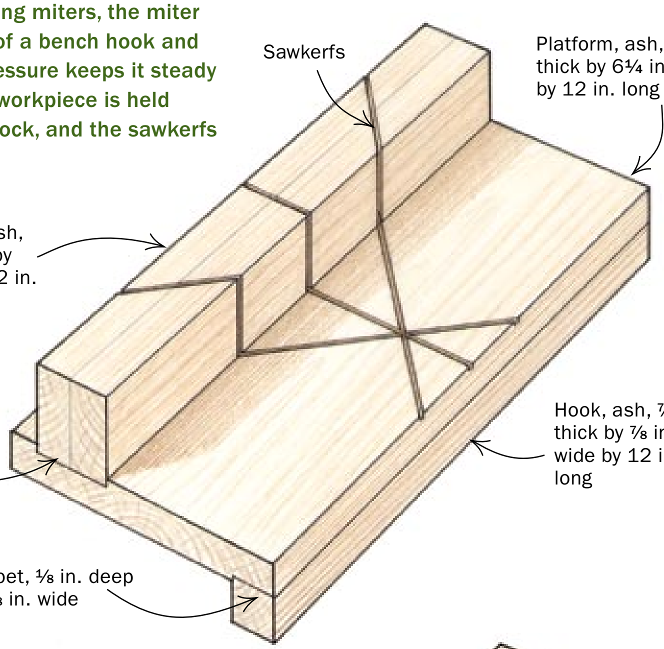
This shooting board requires a hook on both ends because it is designed to be reversed for trimming miters in opposite directions. My shooting board sits on the bench at a tilt, which isn't a problem; however, you can make it long enough to straddle the bench.

When using the miter shooting board, I generally align the layout line of the miter with the end of the fence on the shooting board. Hold the stock snug against the fence, and pass the plane over the stock with repeated strokes until it stops cutting.

Other tips for using a shooting board—To keep a plane cutting smoothly on a shooting board, apply wax to all of the working surfaces of the plane and bench hook. It also is important that the plane's side be perpendicular to the sole. Also, align the blade parallel with the sole, and adjust it for a light cut. When struggling with harsh grain, dampen it with water.

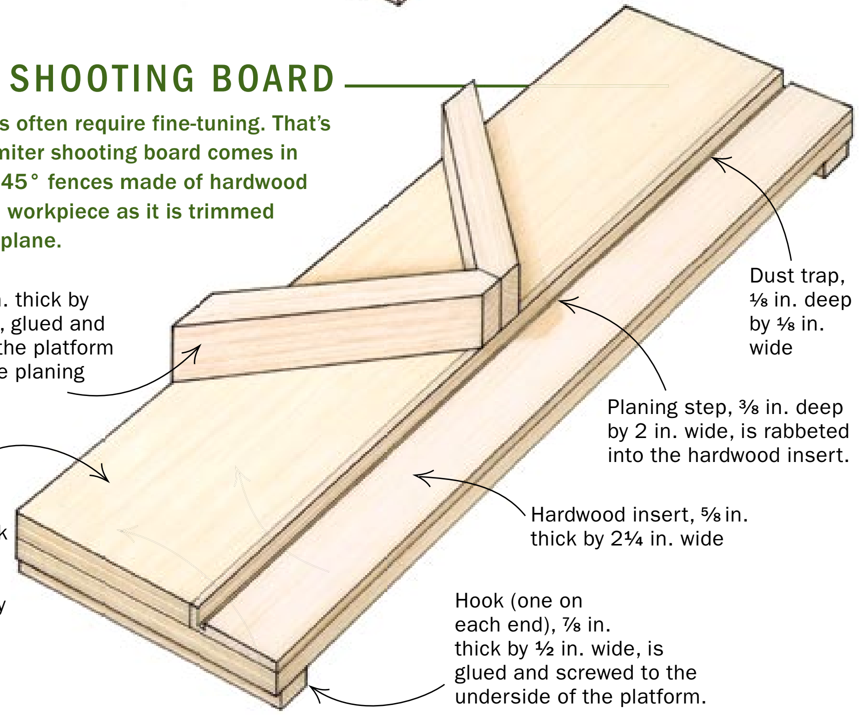
MITER BLOCK

Designed for rough-cutting miters, the miter block is a combination of a bench hook and a miter box. Forward pressure keeps it steady on the bench while the workpiece is held tight against the stop block, and the sawkerfs guide the sawblade.



MITER SHOOTING BOARD

Sawn miters often require fine-tuning. That's where the miter shooting board comes in handy. Two 45° fences made of hardwood support the workpiece as it is trimmed with a jack plane.



How much should you cut? *Any material that extends beyond the stop block will be trimmed away. Use your layout lines as a guide.*

Drawing: Vince Babak

User's Guide to Block Planes

Five common tasks for the handiest plane in the shop

BY CHRIS GOCHNOUR

One of the tools I reach for most often is a block plane. With its compact size and comfortable palm grip, it is an extension of my hand. I almost always have a block plane within reach as I navigate through the diverse tasks of custom-furniture building.

A finely tuned block plane is a pleasure to use. Quiet, efficient, and precise, it can slice tissue-thin shavings off end grain, eliminate mill marks from board edges and ends, shape a radius or a chamfer on a board's edge, and fine-tune and clean up joinery. Over the years, I've refined the way I tune and use this plane, based on the tool's unique geometry and features.

Typically made of metal and varying in length from 4 in. to 7 in., block planes are ideal for planing small parts and reaching into tight areas. They can be used one- or two-handed, either pushed or pulled. The blade is bedded at a low angle—between 12° and 20°—but the bevel faces upward, creating an actual cutting angle of 37° to 45° (if the blade is sharpened at 25°). The low blade angle allows for a palm-and-finger grasp and a low center of gravity, creating a more sensitive feel and greater stability. It also puts the blade in more direct alignment with the thrust of the cut, reducing blade deflection and chatter.

Another nice feature of a block plane is that the upward-facing bevel is supported by the bed all the way to its cutting edge. This further stabilizes the blade, so it gives rock-solid performance even in harsh end-grain planing. A final attribute of many block planes is an adjustable throat. This enables you to fine-tune the throat from a wide opening that accommodates a free flow of coarse shavings to a narrow slit that's capable of supporting the finest cut, leaving a smooth, tearout-free surface.

With a sharp, well-seated blade in your plane (for more on tuning up a block plane, see p. 60), you are ready to tackle many tasks. There are five crucial woodworking operations that a block plane handles easily. A standard-angle plane works better for some of these tasks; for others, a low-angle plane is preferable (below).

Clean up saw and mill marks

Due to their compact size and stable footing, block planes are ideal tools for

1 REMOVING MILL MARKS

With its low center of gravity, the block plane excels at slicing machine marks off the edges and ends of boards.

Edge vs. end grain. *To plane edge grain (left), check the grain direction and use a standard-angle plane. For end grain, use a low-angle plane, if possible, and chamfer the far edge (above) beforehand to avoid splintering. Skew the plane to create a shearing action (right), and wet the wood with paint thinner or water if you encounter stiff resistance.*

Low-angle vs. standard block plane

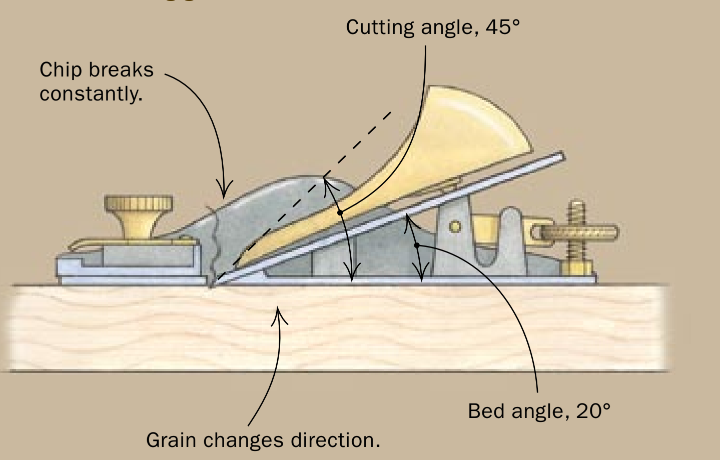
Years ago, when I first tried my hand at planing, I used a low-angle block plane to level the front edges of a figured mahogany dresser. I was puzzled by the torn grain that resulted, because I knew my plane was well tuned and razor sharp. After further experimentation, it became clear that I had not chosen the right plane.

Understanding cutting angles will help you select and tune a block plane that will handle the task at hand effectively. The cutting angle is the angle formed by the workpiece and the top of the blade. A low cutting angle requires less energy, reduces friction (enabling the blade to stay sharp longer), and minimizes blade deflection and chatter, allowing the blade to slice through long grain or end grain with less effort. However, a low-angle blade has more trouble on figured or changing grain because the low angle produces a knifelike cut that tends to lift and pry, tearing the grain.

Conversely, a standard block plane with a steeper cutting angle requires more energy to use, generates more friction, and dulls more rapidly. It also is more susceptible to chatter. However, these qualities make a standard block plane more valuable on long grain, where its wedgelike cut will not lift, pry, and tear the grain.

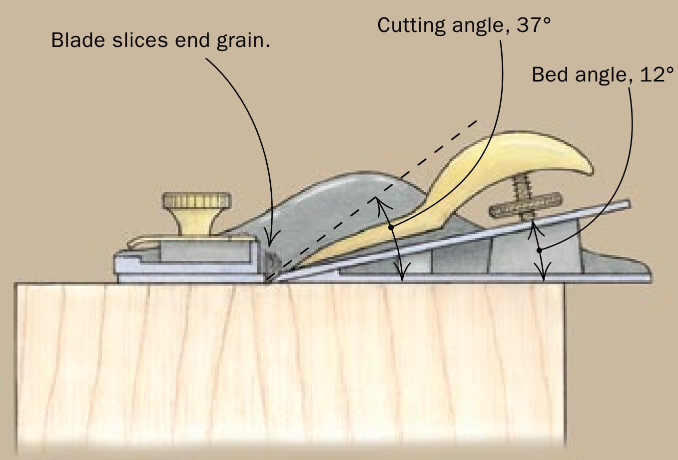
STANDARD ANGLE FOR LONG GRAIN

A 45° cutting angle is harder to push through the wood and causes the blade to dull more quickly, but it breaks the chip aggressively for a cleaner cut in long grain.



LOW ANGLE FOR END GRAIN

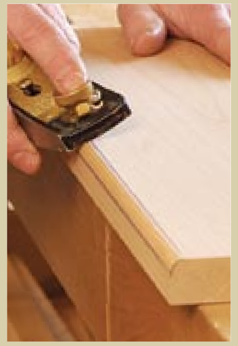
A low cutting angle requires less force to slice through tough end grain, and the blade doesn't dull as quickly.



Photos: Asa Christiana; drawings: Vince Babak

2 CHAMFERING AND ROUNDING EDGES

The block plane excels at working the edges of a workpiece, from roundovers to wide bevels to just lightly breaking an edge.



Chamfers and roundovers. *Draw reference lines on the edges and ends of the workpiece. For roundovers (above), stop short of the lines with the first bevel and then bevel the new corners. Finish with fine sandpaper.*

Large bevels can start on a machine. *The wide bevels on this drawer bottom were roughed out on the tablesaw, but they were finished and fitted to the drawer with a few passes of a block plane.*

eliminating mill marks from edge and end grain (see top photos, p. 57). Secure the board and use a light cut. Generally, you should push the plane, but if the grain direction changes, it's easy to turn around the plane and pull it toward you.

It is important to keep the edge square. If your machinery is set up squarely, you can use the mill marks as a reference, planing until the marks disappear evenly. Pencil marks across the board edge also will serve as a reference. In time you will develop a feel for the job, enabling you to maintain a square cut without using any reference marks.

Removing mill marks from the ends of a board can be a bit more challenging because of the tough nature of end grain and its tendency to splinter at the unsupported edge of the cut. For this job, a low-angle plane is better than a standard block plane. Set the plane for a very light cut and make sure the blade is sharp. I have found that skewing the plane is a very effective technique here, producing a shearing action that contributes to a smoother, cleaner cut on end grain. Skewing the blade also lowers the effective cutting angle. For example, if the plane has a 37° cutting angle and is skewed 45°, the effective cutting angle becomes a low 28°.

Generally, I plane board ends with one continuous stroke from edge to edge. To prevent a chipped edge at the far end of the cut, there are a few things you can try: Plane a small bevel on the far edge to reinforce the fibers, or clamp a piece of scrap to the back edge to support it. Also, you can plane toward the center of the board from both edges.

Certain woods have harsh end grain that will dull the blade of a block plane rapidly. Unless you enjoy sharpening, dampen the end grain with water or paint thinner to make the wood more supple, preserving the blade's edge.

Round and chamfer edges

Block planes excel at lightly softening a hard edge, milling a crisp chamfer, or fully rounding an edge.

To chamfer an edge, make several light passes, rolling the plane slightly with each pass. To make roundovers from $1/32$-in. radius to $1/4$-in. radius, just keep rolling the plane with each pass. After planing, slight facets will remain, but these can be smoothed quickly with fine sandpaper.

To make a rounded edge, lay out the profile on the board edge and end. Because the shaping is freehand, a diverse range of contours can be shaped simply by working to your layout lines. Begin the radius with a few bevel cuts. Then bevel the bevels, gradually shaping the intended profile. Finish with a very light cut and

3 CLEANING UP JOINERY

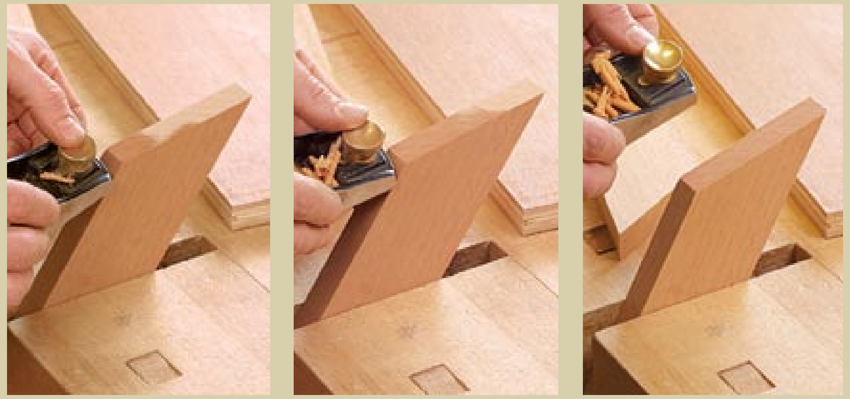
For perfect-fitting joinery, make joints proud and then plane them flush with a block plane.

Plane dovetails in two directions. *First remove the bulk of the excess stock by planing along the row of pins or tails (left) with the nose skewed inward to avoid splintering the end grain. Then work inward from the edge (above) for the last few passes.*

Plane pegs flush. *Plane in a tight circular motion to work toward the center of the peg.*

4 FINE-TUNING MITER JOINTS

Angled cuts from a machine tool aren't always perfect, but a block plane can adjust the fit of miters quickly.



Closing the gap. *This solid-wood edging for a plywood panel has loose-fitting miter joints (left). A series of cuts makes the adjustment. The first cut (above left) changes the miter angle, and successive cuts carry that new angle across the entire joint.*

5 FITTING A DOOR

After installing the hinges, use a block plane to adjust the fit of a door. Start by putting a back bevel on the door stile.

A back bevel (left) will make the next step easier. *It leaves good clearance for closing and only a small amount of wood to be removed during final fitting. Next, install the door and fine-tune the fit (above left). Check your progress frequently, creeping up on a fine, even gap (right).*

multiple passes, rolling the plane continuously. Final touch-ups can be made with a contoured card scraper or sandpaper.

To chamfer or bevel an edge, begin by laying out the cut with pencil lines on the board's edge and ends. Then plane to the layout lines, making sure the cut stays in the center of the two lines. If you stray, make corrections now rather than waiting until you've reached the pencil lines.

When chamfering end grain, skew the plane's nose off the edge of the board so that the blade is cutting the grain downward. This will give a smoother finish.

Clean up joinery

I frequently use a block plane to clean up joinery after gluing. I'll trim tenon pegs flush, moving the plane in a tight swirl and working until the blade skims the surface surrounding the peg. Through-tenons, dovetails, and bridle joints also can be trimmed flush with a block plane.

When making a dovetail joint, for example, leave the pins and tails a bit long. After the glue dries, remove most of the extra material by planing in line with the edge, skewing the plane nose inward, which supports the cut and prevents chipped edges. When the joint is nearly flush, start planing in from the end, cutting lightly until the joint is flush and clean.

Fine-tune miters

Frequently, miter joints require slight adjustments after being cut. A block plane is the perfect tool to accomplish this task. For example, if I'm mitering a solid-wood border around a center panel, and a corner has a slight bird's mouth, I first assess where the material needs trimming. Then, using a series of overlapping cuts followed by one continuous pass, I make the adjustment with a block plane and check the fit.

Even if the joint has been cut accurately, one light cut on each miter will quickly eliminate any irregularities that sawblade deflection may cause, ensuring an invisible glueline.

Fine-tune gaps on doors and drawers

Nothing works better for evening out the gaps on cabinet doors and drawers than a block plane. I appreciate how its compact size allows a one-handed grip, freeing the other hand to steady the work. Depending on the location of the door or drawer being fit, sometimes I push the plane; other times I pull.

To ensure that a door stile has enough clearance and doesn't hit when opened or closed, I recommend a slight bevel from the door's front to back. This bevel is shaped easily with a block plane, even with the door in place. Another reason for this back bevel is that only a small amount of wood needs to be removed during the subsequent final fitting. □

Chris Gochnour makes furniture in Murray, Utah, and teaches woodworking around the country.

Tune up the plane for best results

Whether you choose a low-angle or standard plane, an initial tune-up makes all the difference. Each time I tune up a plane, I follow a sensible order of refinements, beginning with the sole of the plane and then progressing to the bed, the lever cap, and finally the blade.

1. FLATTEN THE SOLE

A convex or concave sole will leave the cut unsupported, causing unpredictable results, so I always check to see whether the sole is flat. Before lapping the sole flat, I also check that the adjustable throat seats well in the plane body. Remove the throat plate and check for any burrs or debris and then use a file to eliminate any trouble spots. Reassemble the plane, making certain the throat plate seats properly and moves freely.

I flatten planes by putting abrasive paper on a flat surface (plate glass, a slab of granite, or a jointer bed) and lapping the bottom of the plane. I always keep the blade in the tool, properly tensioned but raised above the sole. Begin with 80 grit and then follow with 150 and 220. You can stop there and let actual use further polish the sole, or go one more step to 320 grit.

Lap the sole. *Attach coarse- and medium-grit sandpaper to a flat substrate and flatten the bottom of the plane until the sandpaper hits the entire sole. The area around the blade is the most critical to get flat. The scratch pattern will tell you how much more steel to remove.*

Online Extra
For even more tips on handplanes, and to see Gochnour tuning up a block plane, go to **FineWoodworking.com/HTextras.**

2. TUNE THE LEVER CAP AND BED

The blade must have a snug fit with the lever cap and the bed of the plane. First remove any rough burrs or sizable drips of japanning (black paint) that prevent a stable fit between the cap and blade. Then check that the bed of the plane is free from rust, paint globs, grime, or coarse machining. The blade must have a solid footing to remain still under pressure.

Eliminate any imperfections with careful filing, being cautious not to make matters worse by being reckless with the file.

Tune the lever cap. *While protecting the back of the cap assembly with a piece of paper, sand the paint off the front edge for a snug fit with the blade.*

Level the bed. *Insert a small wood block into the back of the plane body as shown (right), to raise the file to the blade angle. Don't over-file.*

3. LUBRICATE THE PARTS AND HONE THE BLADE

The plane's vertical adjuster and adjustable throat will work more smoothly with a light drop of machine oil on each part. A little paste wax on the sole of the plane will keep it gliding freely and prevent rust.

Sharpen the blade as you would any other, remembering that the sharpening angle of a block plane impacts performance. Because a block plane has its bevel up, its cutting angle is the sum of the bed and the sharpening angle. I sharpen my standard (20° bed) and low-angle (12° bed) planes with a 25° bevel, producing 45° and 37° cutting angles, respectively.

I use a honing guide because it helps maintain the desired bevel angle. There are two sides to a sharp edge: the bevel and the blade's back. I take both surfaces to 6,000 grit on my waterstones.

Adjust the throat. *A small gap in front of the blade supports the finest cuts; a larger gap is required for heavier cuts.*

Wax the sole. *This protects the plane from rust and makes for smooth sliding action.*

9 Tasks for a Shoulder Plane

Indispensable tool is the secret to tight-fitting joints

BY CHRIS GOCHNOUR

It's easy to dismiss the shoulder plane as a "specialty" plane, another way of saying it has limited use in most shops. But that has not been my experience. I use this tool almost every day in my furniture-making shop. When I teach woodworking and show students what the shoulder plane can do, it quickly becomes the most borrowed tool from my tool chest.

Early in its history, the shoulder plane was used most often to plane the shoulders of hand-cut tenons, hence its name. The blade is bedded at a low angle, with the bevel facing up, making it well-suited for planing end grain. It can be used one- or two-handed.

What really sets the shoulder plane apart from other handplanes is its narrow body profile, with the sole precisely milled square to its side and a blade that spans ever-so-slightly beyond the full width of the sole (see drawings, facing page). That means the blade is sure to cut fully into a corner without producing an unsightly cut line. Granted, you can use a chisel to get into a corner, but a shoulder plane does it faster with more control. Because the side of the plane and the sole are square to each other, each face of the corner remains square. Also, compared to a chisel, the plane makes it easier to keep the surfaces perfectly flat.

I reach for my shoulder plane all the time. When making a wall cabinet recently, I used the plane in nine different places. For many of these tasks, the shoulder plane simply is the best tool for the job. The following pages illustrate the many ways I put a shoulder plane to work on just one cabinet. No doubt there are other applications as well.

Chris Gochnour builds furniture in Murray, Utah, and teaches woodworking around the country.

Photos: Tom Begnal; drawings: Kelly J. Dunton

1 Trim tenon cheeks to fit

Perhaps the task where I use a shoulder plane the most is fine-tuning the fit of tenons to their respective mortises. I use machinery to cut the tenons. But I don't aim for a perfect fit from the machines, mainly because there are enough slight variables in the process to make perfection hit or miss. Instead, I use the machines to produce a very tight fit. Then, when it's time to dry-assemble the parts, I use the shoulder plane to shave each tenon cheek. This gives me complete control, and I end up with a perfect fit every time.

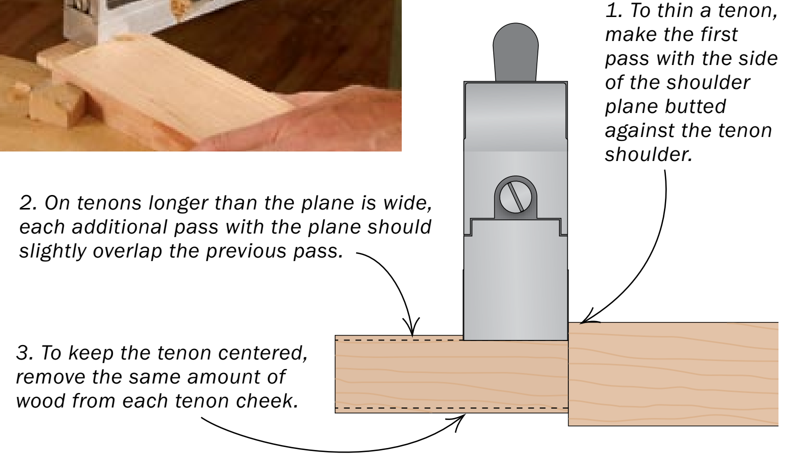
Before starting, set the plane for a very light cut. Check to make sure the blade is parallel with the sole of the plane. Plane across the grain, taking light passes. If the tenon is longer than the plane is wide, use slightly overlapping passes, starting at the shoulder and working toward the tenon end.

Be sure to plane the same amount from both cheeks. If you don't, the position of the tenon relative to the face surfaces of the workpiece will change slightly, and the face surfaces of the mating parts won't be perfectly flush when assembled.

There's another advantage to starting with a tight fit. If, during dry-assembly, I discover any misalignment of the face surfaces of the mating parts, I can make a correction. This is done by identifying where the joint is misaligned and planing one cheek of the tenon until the misalignment is corrected.

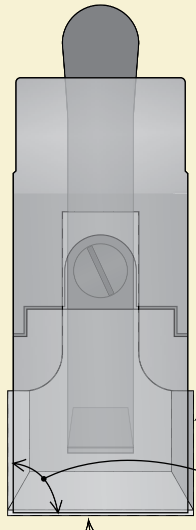
While I'm at it, I use the plane to chamfer the tenon end. This helps reduce the amount of glue that gets scraped to the bottom of the mortise during glue-up.

Trim tenon cheeks. *No matter if the workpiece is narrow or wide, a few light passes on each tenon cheek will transform a tight-fitting joint into one that fits perfectly.*



Set the blade extension

A shoulder plane needs to be sharp and well-tuned. The tuning process involves several steps; one of them making sure that the side edges of the blade extend about 0.002 in. beyond the sides of the plane. Gochnour uses two sheets of paper to establish that distance. The paper goes on a flat surface with a narrow piece of 400-grit sandpaper in between. Then, with the edge of the blade on the sandpaper, and the front and back of the plane resting on the paper, he slides the plane back and forth to sand down the edge. When the sandpaper stops cutting, the blade extension will be spot-on.



2 Refine tenon shoulders

Traditionally, tenon shoulders were cut with a backsaw, then cleaned up with a shoulder plane. While today's woodworker probably makes shoulder cuts on a tablesaw, occasionally misalignment creeps in. With its low-angle, full-width blade, sole squared to its sides, and solid construction, the shoulder plane excels at working those tough end-grain fibers.

When working shoulders, set the plane for a very light cut and make multiple passes. If planing a narrow shoulder like that of a cabinet door, use a bench hook to support the stock. Lay the board flat on the bench hook (for more on bench hooks, see pp. 54-55) and align the shoulder flush with the end of the bench hook's planing stop. This supports the edge of the shoulder and helps prevent splintering. To prevent splintering when working on wide shoulders, clamp the workpiece in a vise with the tenon facing up. Make your first planing cuts from the end of the shoulder to the middle. Then do the same from the opposite end of the shoulder. Work carefully so that the shoulder line remains straight.

Trim tenon shoulders. *When trimming relatively narrow tenons, Gochnour finds a bench-hook jig (above) makes the process easier. The jig's built-in fence helps prevent tearout. Wider workpieces are mounted in a vise and cut without the aid of a bench hook (left).*

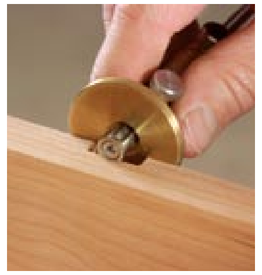
3 Tune dadoes and grooves

Every now and again, a dado or groove needs to be cut a little deeper. If the joint is wide enough to accept a shoulder plane, I use one to do the job. It's generally faster and easier than resetting the machinery that made the cut initially.

At each end of the dado or groove, use a marking gauge to define the new depth. Adjust the shoulder plane's mouth opening and blade depth for a medium cut so that the work progresses quickly.

To help avoid tearout, start by planing from one edge of the workpiece toward the middle of the piece. You need only plane for a few inches. Then do the same from the other end. Finally, plane the area between the end cuts.

Sometimes I cut a dado entirely with hand tools. To do this, use a backsaw to cut the dado sides to the desired width and depth. The material that remains is removed mostly with a paring chisel working across the grain. Then, the shoulder plane finishes the job in the manner described above.



Deepen a dado or groove. *A dado or groove that's too shallow can be deepened slightly by establishing the new depth on each end with a marking gauge (above). Then use the shoulder plane to cut to the marked lines (right). To go even deeper, you might need to run a knife blade along the inside edges of the dado to sever the fibers there.*

4 Cut rabbets

A shoulder plane can cut small rabbets. First, define the base and depth lines with a marking gauge. Then, to create a fence, clamp a straightedge board to the workpiece, making sure it is aligned with the baseline.

Open the mouth of the plane to about 1⁄32 in. to accommodate heavier shavings, and then advance the blade for a medium cut. Hold the plane in both hands with its side firmly against the fence. Make multiple passes as needed. When you reach the depth lines, the rabbet is complete.

Cut a rabbet. *First use a marking gauge to mark the rabbet width and depth (left). After that, clamp a wood straightedge to the workpiece and start cutting (right).*

5 Tweak rabbet joints

Rabbets are mainstays in woodworking joinery and often will benefit from a tweak with a shoulder plane. I periodically use the tool to correct a misshapen opening for a cabinet back, to improve the fit of a rabbeted case joint, or to size the rabbet of a recessed door panel to just the right fit in a door frame.

Many shoulder planes have a unique feature—they convert to a chisel plane in no time. When a corner meets a corner, like when two rabbets meet at right angles, a chisel plane is the perfect tool for getting into that corner.

Fine-tune a rabbet. *A rabbet that's a little too fat can be thinned simply by making a few passes with the plane (above). Rabbeted parts that are slightly misaligned when assembled can be realigned quickly by converting the shoulder plane into a chisel plane (right).*

6 Adjust tongue-and-groove joints

I like the look of tongue-and-groove boards on cabinet backs. I try to fit this joint tight off my machines so that the alignment of the boards is just right. Every now and again, though, a joint is a bit tight and requires the tongue to be slightly thinned. I'll finish it in no time with a few passes of the shoulder plane.

Hold a small board in one hand and plane with the other. On a larger board, plane with both hands, securing the board to the workbench with bench dogs and the tail vise.

Take a shaving or two off each side of the tongue and check the fit. Continue until the fit is perfect.

Tweak a tongue. *A tongue-and-groove joint is a chore to assemble when the tongue is too tight. A few swipes on each side of the tongue solves the problem in short order.*

8 Soften sharp edges

I use a shoulder plane to soften sharp edges that are inaccessible with other planes. For example, on a beadboard back, it's easy to soften the sharp edge on the milled bead by reaching in with the edge of a shoulder plane. Because the blade isn't sharpened on its side edge, the plane won't mar the details that are adjacent to the edge being worked.

To soften or round the edge, set the blade for a light cut and begin with the plane tipped on its edge at about a 50° angle, with the corner of the blade reaching into the bead. Make a series of passes, rolling the plane more upright with each successive pass.

Go places other planes can't. *The sharp edge adjacent to the beaded edge of the cabinet backboard is easy to soften with a shoulder plane.*

7 Remove machine marks

On flat surfaces, milling marks are easy to clean up with handplanes, scrapers, or sanders. But a shoulder plane is the best tool for cleaning up inside corners.

On the top and base molding of this cabinet (right), I can plane right up to the raised lip that's machined along the entire length. However, I need to work carefully because I don't want to alter the depth from one piece of molding to the next. I handle this by setting the plane for a very light cut and letting the machine marks serve as a reference to show where and how much material to remove.

On the shallow rabbet that decorates the inside edge of the cabinet door (facing page), I need to remove the router-bit marks before assembly. The shoulder plane is perfectly suited for the task.

A spare plane blade, sharpened to a steeper angle (35° to 40°), can come in handy for long-grain areas with tricky grain. The steeper cutting angle reduces the prospect of unsightly tearout.

Clean up machine marks. *Decorative rabbets on the door fronts (right) and the top and bottom moldings (above) of a case have surfaces that will be exposed when the cabinet is assembled. The shoulder plane is perfect for cleaning up the machine marks left by the tablesaw or router.*

9 Trim mitered molding

The crisp alignment of mitered moldings is a hallmark of fine craftsmanship. Try as I might to get things just right, there are occasions where after the glue is set, slight adjustments must be made to the fit of the molding. These are especially problematic where the molding meets the front or side of a case.

A shoulder plane can be used here as you might a chisel, but with a sole to add control. With a shoulder plane you can carve, shape, and realign moldings for a clean, crisp look.

Plane moldings flush. *The top edges of these base moldings were slightly misaligned. Gochnour used a shoulder plane to make their junction perfectly flush.*

BASIC **SKILLS**

Using Spokeshaves

For shaping and smoothing curved parts, nothing beats these time-honored tools

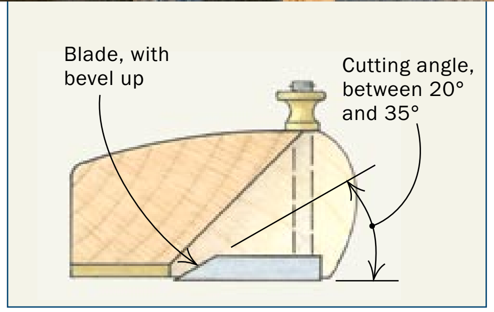
BY CHRIS GOCHNOUR

Low-angle vs. standard-angle shaves

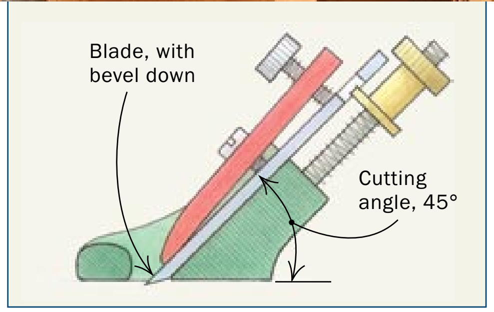
Although some woodworkers classify spokeshaves based on the material they are made from (wood vs. metal), the real difference among these tools is how the blade is oriented (bevel up or bevel down) and thus the cutting angle created by that orientation.

Spokeshaves that have blades bedded bevel up have low cutting angles, from 20° to 35° depending on the bevel angle. The lower cutting angle makes it easy to take heavy cuts. Spokeshaves with blades bedded bevel down, which I call standard-angle shaves, have a steeper cutting angle of around 45°. The steep cutting angle deftly handles tricky grain.

LOW ANGLE: DEEP CUTS



STANDARD ANGLE: VERSATILITY



I recently completed a writing desk that had curves and contours nearly everywhere—in the legs, the aprons, the drawer fronts, and even the top. All of those curves meant that my trusted handplane had to spend a lot of time on the shelf. The handplane, after all, is designed to make things straight and flat. For this project, I reached instead for the handplane's versatile cousin, the spokeshave.

Spokeshaves are simple tools, consisting of a wooden or metal body with handles, a blade, and a narrow sole. The tool often is associated with chair makers, who use it with a drawknife for shaping spindles, legs, and rungs. But with a spokeshave alone, you can perfect and smooth any number of curved furniture parts, from complex cabriole legs to simple arched table aprons.

There are many diverse styles and models of spokeshaves. For this article, I focused on 11 shaves with flat soles and straight blades. This type is a good, all-around performer, capable of handling most curves. Within this group, the shaves are classified as low angle or standard angle, depending on how the blade is bedded. Both low- and standard-angle shaves have their places. The secret lies in knowing which type of shave is best suited to the work that you do.

Spokeshaves can be pushed or pulled

Spokeshaves are finesse tools, and with a little practice, they are a pleasure to use. They're equally suited to being pushed or pulled with the grain in either a straight or skewed position. When pushing the shave (left photo, below), place your thumbs on the back, just behind the blade, your index fingers on the top front edge, and your other fingers on the handles. Use your index fingers to push down the front of the shave and your thumbs to power the shave through the cut. When pulling the shave (right photo, below), move your index fingers to the back to power the shave and exert downward pressure on the front with your thumbs to keep the shave steady.

Three ways to reduce chatter

A problem with spokeshaves is their propensity to chatter. But this tendency can be overcome by taking light cuts, holding the shave properly, and working with the grain. Another way to overcome chatter is to skew the shave, which lowers the blade's effective cutting angle, reduces resistance, and makes the shave cut with greater ease, particularly on end grain. When smoothing gentle curves, skewing the shave in effect lengthens the sole, giving it a broader footing and helping to stabilize the tool. On tighter curves, skewing the shave has the effect of raising the blade to give a lighter, polishing cut in the final passes.

Chris Gochnour makes furniture in Murray, Utah, and teaches woodworking around the country.

Skew for a clean cut

***Smooth cuts in tough areas.** Skewing the shave on end grain and tricky or reversing grain helps reduce the effective cutting angle of the tool, allowing for smooth cuts without chatter.*

Work with the grain

***Like all cutting tools, spokeshaves work much better with the grain.** On a concave surface, that means starting at the ends and pushing (above) or pulling the tool (right) downhill toward the middle. On a convex surface, work from the middle toward the ends.*

Photos: staff; drawings: Vince Babak

A well-tuned scraper. *With polished edges and a small burr, it takes only a light push (left) to get clean shavings off almost any wood surface.*

BASIC **SKILLS**

Card Scraper Tames Tearout

Simple guide block makes it easy to sharpen

BY BRIAN BOGGS

I started using scrapers more than 20 years ago, and I'm still learning their nuances. But I'm convinced they are essential tools for woodworkers. Card scrapers are ideal for lightly cleaning up areas of torn or gnarly wood that no other tool can deal with. This is not to say that scrapers cut better than planes; they seldom do. On really difficult grain, though, a scraper can finish a surface where almost any smoothing plane will need follow-up work.

Scrapers range in thickness from 0.016 in. (0.4 mm) to 0.042 in. (1 mm). I prefer to use 0.032-in. (0.8-mm) scrapers. The 0.020-in. (0.5-mm) and thinner scrapers flex nicely to smooth out hollows, but they make it harder to maintain a flat surface. With thick scrapers, you risk the corners gouging a groove in the wood, but for heavier work, their stiffness is a virtue.

How a card scraper works

Scrapers and planes both attempt to do the same thing: cut wood without tearing the surface. Planes do this with the edge of a sharp blade and a part called a chipbreaker. Scrapers cut with a burr edge, and the face of the scraper acts as the chipbreaker. As the scraper is angled forward, it takes a more aggressive cut. The downside is that the extra downward force actually crushes the pores as the scraper moves along, leaving a slightly fuzzy surface behind. The solution is to follow with a lighter cut, made with the scraper more upright, which will exert less downward force and leave a cleaner surface. A good way to maintain this higher angle and take a lighter cut is by pulling the scraper toward you.

The most common mistake is to try to remove too much material. Beginners tend to create an enormous burr on the scraper and then angle the blade forward, hogging off vast shavings. Not surprisingly, their thumbs get hot from the friction, and they find it difficult to maintain the flat surface of the workpiece. You can use all four edges of a card scraper, so as soon as you feel the blade getting warm, turn it over and use another edge. The burr will last longer if it is kept from overheating.

Preparing a scraper

Sharpening card scrapers is a task that frustrates even experienced woodworkers, but I use a jig that gets rid of the guesswork.

Most scrapers need a lot of honing when new. Cheaper scrapers need initial work on a medium (325-grit) stone, but a fine (600-grit) stone is good for better scrapers. Hone away until the sides and edges of the scraper are smooth and meet at 90°. Now it's time to form the four cutting burrs. Lay the scraper on a piece of wood about 1 in. from the edge. With an oiled burnishing rod resting on, and at about a 45° angle to, the edges of the scraper and the wood, stroke the scraper a couple of times. This stretches out the corner of the scraper so that you can turn a longer burr.

The burr on a well-tuned scraper is so small that I can't tell what angle it actually is, but I think it is less than the 5° normally recommended. To help create the perfect burr on a scraper, I use a wooden guide block, which also is used for honing. With the guide block locked in a vise, slide the burnishing rod across an edge of the scraper with the rod angled forward so that it rolls the burr off the edge.

With a well-honed edge, the weight of your hand and forearm should generate enough pressure to turn the burr. The rod has only a small area in contact with the scraper, which translates into a lot of pressure per square inch. The more passes you take, the more you will roll the burr, thus changing the cutting angle, so try to get the job done with one or two passes.

Renewing a scraper—You can repeat the stretching and rolling steps two to six times without rehoning, depending on the wood and the amount of material you are removing. Eventually, the edges of the scraper will become hardened from the burnisher, and a new burr won't form. Before rehoning, file away the hardened metal. Lay a single-cut bastard file on the bench and stroke the blade over it, perpendicular to the file. You'll feel the file start to cut easily as soon as the hardened surface is removed.

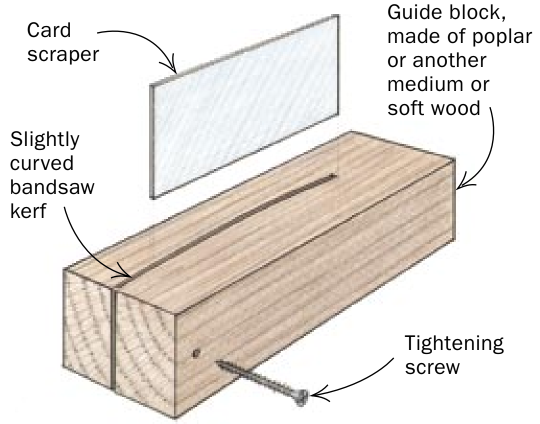
It may take you a few tries before mastering your card scrapers, but stay with it. You will be rewarded with greater efficiency and a more enjoyable finishing process on all your projects. ☐

Brian Boggs is an acclaimed chairmaker in Berea, Ky.

Hone the edges of the scraper. *A guide block helps hone the edges 90° to the sides. The scraper should fit loosely enough that it can be pushed onto the sharpening stone.*

Sharpening a scraper

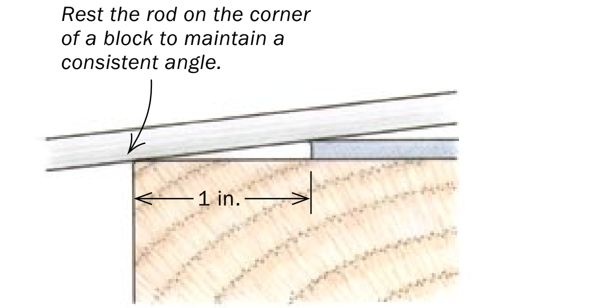
1. SMOOTH THE FACE AND EDGES



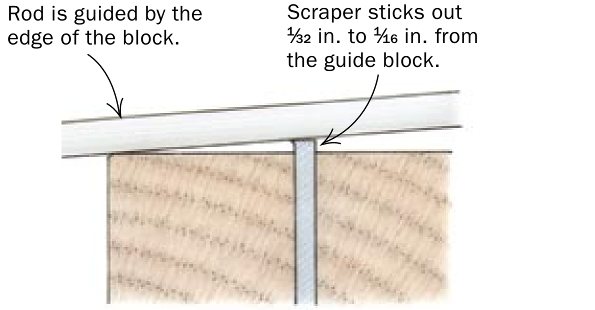
Then hone the sides. *Polish the sides of the scraper on a fine diamond plate or sharpening stone.*

2. RAISE A BURR

Stretch the edge. *Push the burnisher along the side of the scraper to draw out a burr.*



Roll the burr. *With the scraper in the guide block, slide the burnisher at a 45° angle to roll the burr off the edge. It should take only one or two passes.*



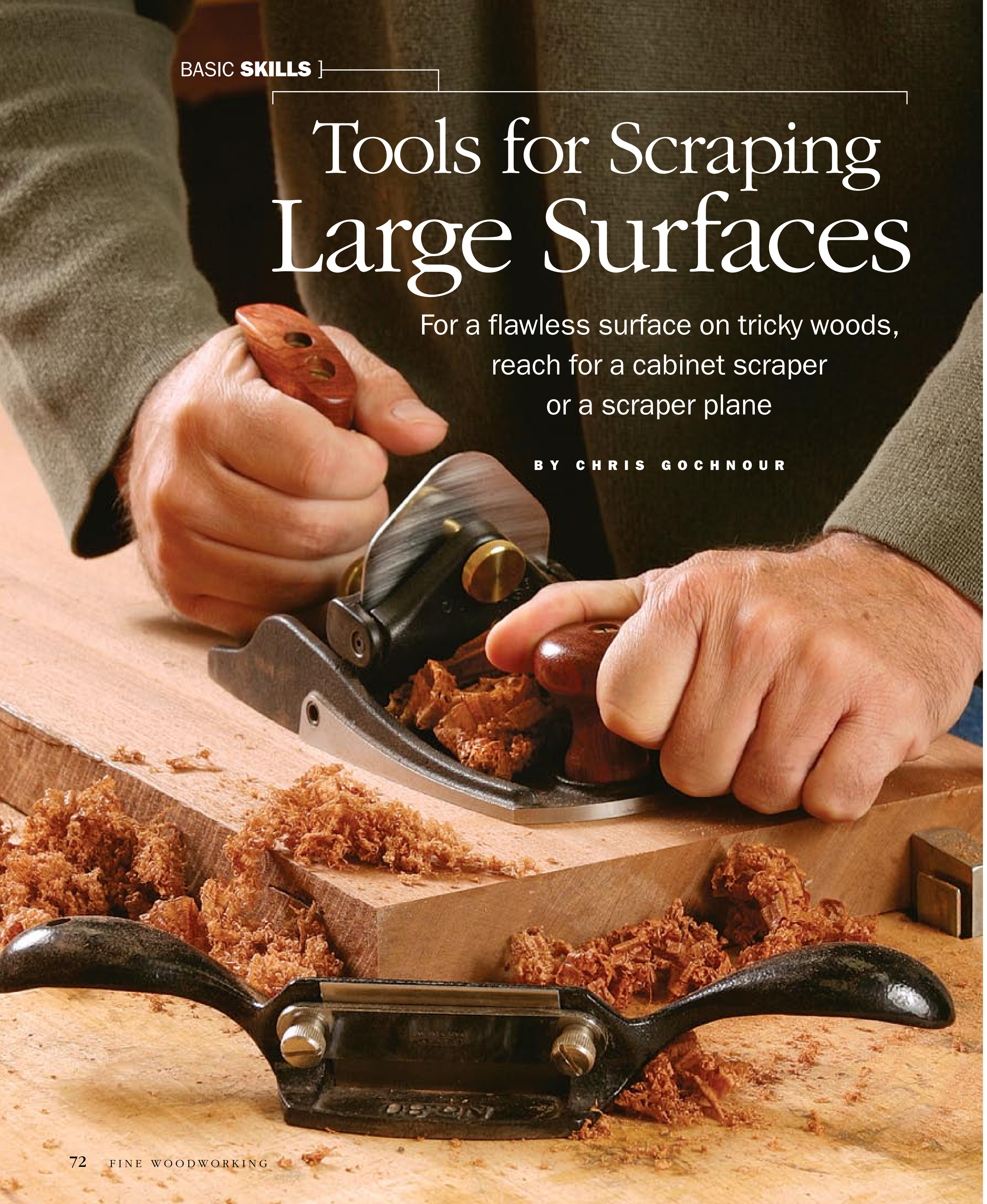
Online Extra
To see the card scraper in action and learn two more ways to roll a sharp burr, go to **FineWoodworking.com/HTextras.**

Photos: Mark Schofield; drawings: Vince Babak

Tools for Scraping Large Surfaces

For a flawless surface on tricky woods, reach for a cabinet scraper or a scraper plane

BY CHRIS GOCHNOUR



When bench planes begin to tear out tricky grain or balk at tough woods, many woodworkers reach for a card scraper. But that isn't always the best choice. Often, especially on large, flat surfaces, the job can be done easier, faster, and better by using one of the card scraper's bigger, lesser-known brothers: the cabinet scraper and the scraper plane.

I use all three scrapers in my shop, because each one has its place. Once you understand what they can do for you, what they cost, and how to use them, you can decide for yourself whether to add one or more to your tool cabinet.

Basic card scraper is best on smaller surfaces

Because it's held in both hands with finger pressure slightly flexing the steel, a card scraper lets you make light to moderate cuts depending on how it is held and engaged with the wood surface. The scraper can be pushed or pulled. To make cutting easier, I sometimes create a shearing cut by holding the scraper about 30° to the direction of travel.

As useful as a card scraper is, though, it has significant limitations. It is not an aggressive tool, so it won't remove a lot of material quickly. It cuts with a lot of resistance and, consequently, the cutting edge dulls fairly rapidly. Mainly, though, the card scraper is uncomfortable to hold because your hands are always in contact with sharp corners. Then, too, it creates a lot of friction as it cuts, so the steel can get hot to the touch within minutes. And because it lacks a flat sole to maintain a consistent cutting depth, you have to work carefully to avoid creating shallow dips and valleys.

So, I use a card scraper mostly to smooth smaller surfaces, typically under 18 in. sq. By the time my fingers are hot and my hands are tiring, the work is done. (For more on tuning and using a card scraper, including sharpening at 90°, see "Card Scraper Tames Tearout," pp. 70-71.)

Cabinet scraper can handle everything else

Compared to the card scraper, the cabinet scraper is considerably more comfortable to use, even over extended time periods. The handles provide a place for the hands, and because fingers never touch the blade, heat is a nonissue. Plus, a cabinet scraper is more likely to maintain a flat, even surface because its sole helps regulate and control the depth of cut. The sole also makes it easy to start and finish cuts on the edges of panels. And a thumbscrew at the center of the scraper keeps the blade flexed for you.

Versatile and easy to use—The cabinet scraper excels at removing mill marks from board edges. Its sole provides the control needed to ensure that a board edge stays true as it is worked.

I typically use a cabinet scraper when the surface gets into the 18-in.-sq. to 36-in.-sq. range, such as a tabletop or panel. You can use one on even larger surfaces

When to plane and when to scrape

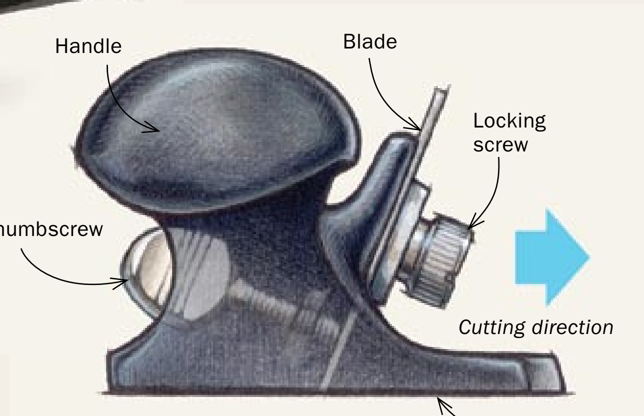
Whenever I'm working to smooth a relatively straight-grained wood, my tool of choice is a handplane. In my opinion, there's no better way to prepare a wood surface for a finish. But wood is not always straight-grained. Sometimes grain is wavy, curly, bird's eye, or has some other form of general nonconformity. I often use such wood for panels and tabletops, as it's a sure way to add a dramatic look to a furniture piece. As you might expect, wild grain—with wood fibers going up, down, and sideways at all angles—can be difficult to smooth. No matter how well the blade is sharpened, or how light a cut you make, a handplane tends to tear grain that runs helter-skelter. That's when I skip the plane and use a scraper.

Contrary to the names, card scrapers, cabinet scrapers, and scraper blades don't scrape—they cut. Sharpened and properly tuned, they can produce a pile of shavings. A couple of factors enable them to smooth wood without tearing the wood fibers. First, scrapers meet the wood at a steep cutting angle. That means it's almost impossible for the steel to get under the wood and lift and pry the fibers. Second, as a scraper cuts, the wood chip breaks immediately. That way, a long chip can't peel back, only to ultimately break and create a noticeable tear.

Figured grain begs a scraper. *When smoothing wood with irregular grain, as in curly maple (top) and sapele (bottom), a scraper is less likely to create tearout than even a finely tuned handplane.*

Cabinet scraper

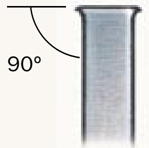
The Stanley No. 80 (available from www.woodcraft.com), a tool that hasn't changed significantly in more than a century, is Gochnour's favorite cabinet scraper. Well-designed, lightweight, and comfortable, it produces excellent results.



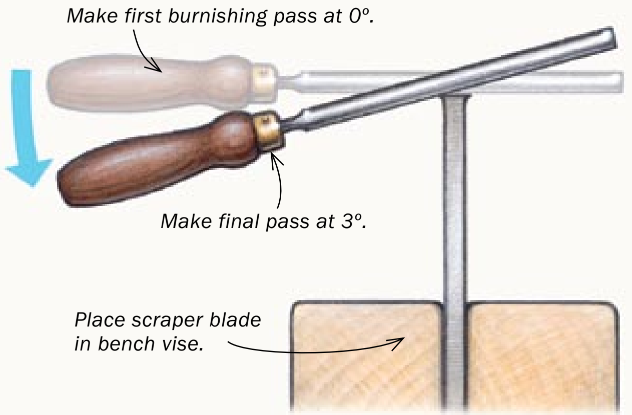
SIDE VIEW

Create shavings, not sawdust. *Properly sharpened and tuned, a cabinet scraper produces long, thin shavings, much like a plane. A typical stroke ranges from 12 in. to 24 in.*

CREATING THE CUTTING BURR



A cabinet-scraper blade can be honed to either 90° or 45°. Of the two options, a 90° angle produces a smoother finish. Plus, you get two cutting burrs along one edge of the blade. See p. 76 to find out how to sharpen a blade to 45°.

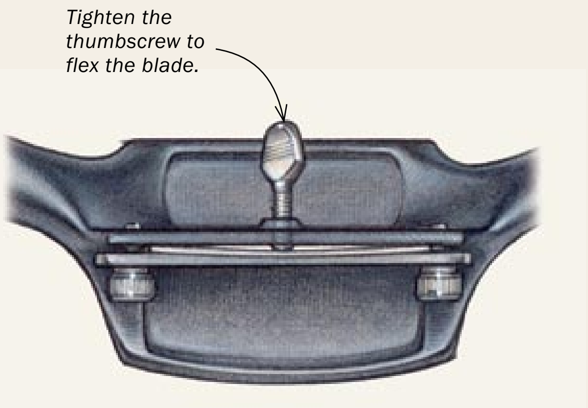


Form the burr. *Hold the blade on the bench and burnish the face, keeping the burnisher flat against the blade (1). Clamp the blade in a vise and create the burr, starting the burnisher at 0° to the edge. Tilt the burnisher 3° and make a few more passes (2).*

TIPS FOR SETUP AND USE

Set the cutting depth. *A sheet of paper and a flat surface are all you need to set the depth of cut.*

Set the blade flex. *Tighten the thumbscrew to flex the blade about 0.002 in. to 0.003 in.*



TOP VIEW

with good results, though that is where I turn to the scraper plane, which I'll cover shortly.

In use, I normally push the tool, but it cuts just as well when pulled. Like a card scraper, a cabinet scraper generally cuts better when skewed to about 30°.

Two ways to sharpen the blade—You have two options when it comes to sharpening a cabinet scraper. You can sharpen it as you would a card scraper, with its edges filed at a right angle to its face and a small burr, or hook, burnished onto each of its cutting edges. I find that cabinet scrapers work very well with this configuration. They are easy to sharpen, and, like on a card scraper, you get two working burrs along each edge.

To sharpen a blade to 90°, I start by securing it in a vise. Then, I use an 8-in. bastard file to create a flat, straight edge. As I push the file, I try to keep it at a right angle to the face surfaces of the blade. Three or four strokes usually are enough to get the job done. Then, with the blade still in the vise, I use a fine-grit, flat slipstone to smooth each side of the scraper at the filed edge. Once the edge is prepared, I'm ready to use a burnisher to form the cutting burr (see drawing, facing page).

The second approach is to sharpen the scraper edge with a 45° bevel. This method produces a more aggressive cutting edge, useful if you want to remove material faster. For example, if a thickness planer produced some fairly heavy tearout, I'd use the 45° edge to speed up the process of thinning the stock until the tearout disappeared (see "Forming the burr," p. 76).

Setting up a cabinet scraper—Place the freshly sharpened blade into the body of the scraper. To establish the blade extension, place one or two pieces of paper on a flat surface. Then, to elevate the sole ever so slightly, place the front of the sole on the paper. Press the blade down against the flat surface while tightening the thumbscrews to secure the blade. This step sets the blade extension to match the thickness of the paper, typically about 0.004 in. per sheet.

Next, turn the scraper over and sight down the bottom of the sole. The cutting edge of the blade should be parallel to the sole. If it isn't, lightly tap the side of the blade with a hammer until it is. Finally, turn the thumbscrews that flex the blade until the blade has a very slight (about 0.002 in. to 0.003 in.) crown. The scraper is now ready to go to work.

TIP

WORKS ON THE PULL STROKE, TOO

Although Gochnour normally pushes a cabinet scraper, there are occasions when it's easier to pull the tool. Either way, it works equally well.

Scraper plane: best choice for large surfaces

All the scraper planes on the market are patterned after the Stanley No. 112, a tool that was developed in 1874. Like the original 112, the new scraper planes have a pivoting lever-cap and thumbscrew that clamp the blade to the frog. The frog is adjustable from zero to 25°, making it easy to dial in the cutting angle of the plane. This adjustment is critical, as the scraper's cutting angle needs to work in harmony with the angle of the burr on the scraper's edge. The pivoting frog also regulates the depth of cut.

Use it like a handplane—Handle the tool just as you would a bench plane. I find that a light touch, with a smooth, steady stroke, produces the best results. Just as with a bench plane, start the cut with pressure on the front knob. As the cut proceeds, equalize the

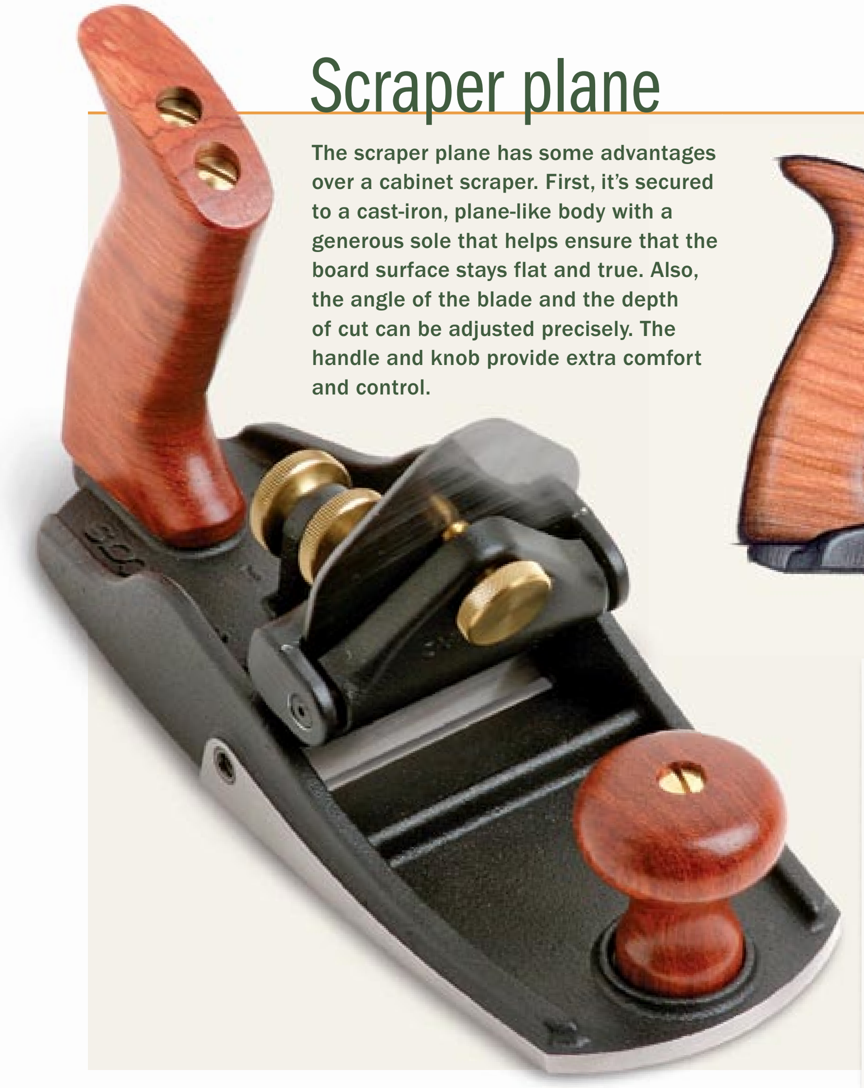
Start flat. *The scraper cuts with less effort when at about 30° to the direction of travel. To start a cut at an edge, add pressure to the forward handle. As the sole slides onto the stock, shift the hand pressure so that both handles end up with downward force.*

Finish flat. *As the sole of the cabinet scraper begins to extend over the end of the board, reduce pressure on the forward handle while maintaining pressure on the trailing handle. Finish the cut with full pressure on the back handle.*

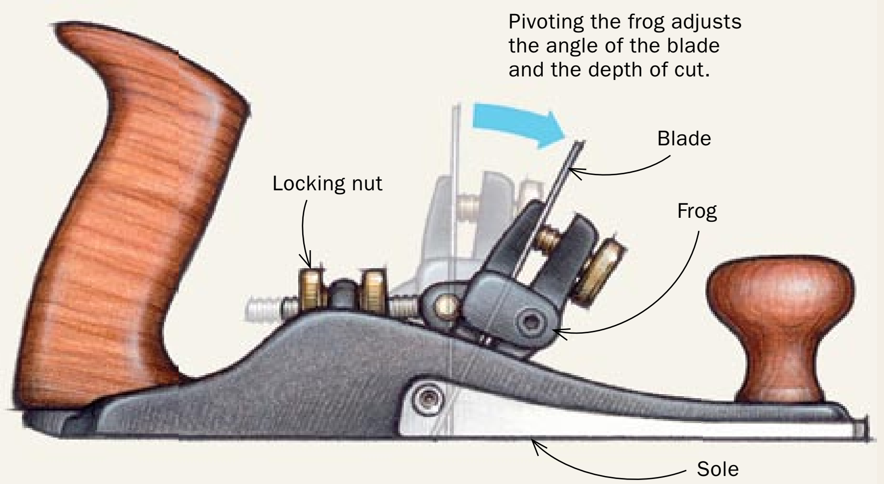
Keep the edges flat. *When scraping close to the edge of a board, allow the sole to overhang only slightly, keeping most of it on the board. That way the cabinet scraper can't tip and give the surface an unwanted taper.*

Photos: staff; drawings: Christopher Mills

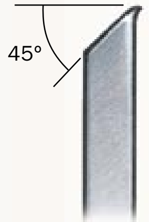
Scraper plane



The scraper plane has some advantages over a cabinet scraper. First, it's secured to a cast-iron, plane-like body with a generous sole that helps ensure that the board surface stays flat and true. Also, the angle of the blade and the depth of cut can be adjusted precisely. The handle and knob provide extra comfort and control.

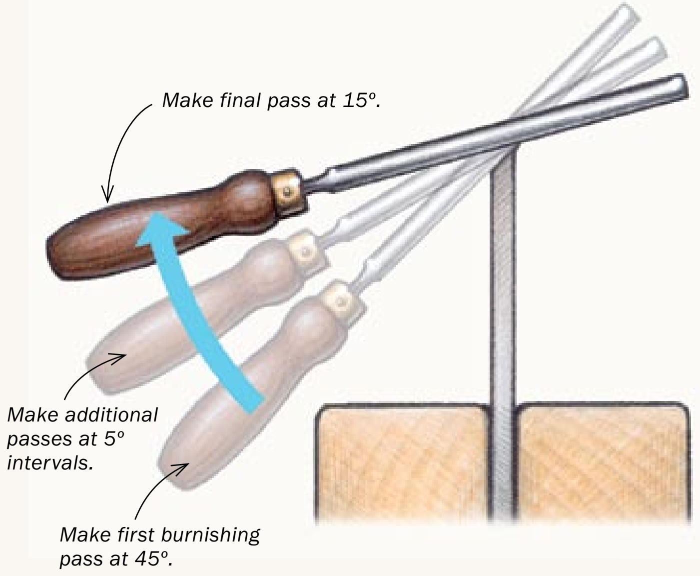


FORMING THE BURR



Gochnour prefers to sharpen the scraper-plane blade at a 45° angle because it produces a more aggressive cut. On the downside, you get one working edge and it can't be burnished as often between sharpenings.

Form the burr on a 45° angle. *Make the first pass along the bevel using a burnisher held at 45° (left). Then make a series of passes flattening the angle by about 5°, with the last pass at 15°. A board with a 15° line provides guidance for the final pass (right).*



pressure on the knob and the rear handle. Then, upon completing the pass, shift your weight to the rear handle.

Choosing a scraper plane—Of the scraper planes on the market, the one made by Veritas (www.leevalley.com) is the only one with an adjustment screw that lets you flex the 0.055-in.-thick blade to produce a slight camber, a feature that makes it less likely that you'll dig into the wood and also gives a very smooth cutting action. On the other models, I keep dig-ins under control by rounding the corners of the blade to about a 1⁄16-in. radius.

Sharpening a scraper plane—The 45° bevel can be created with a file, but I get the best results by "grinding" the edge with sandpaper. First I use spray adhesive to mount 120-grit sandpaper to a flat surface such as a chunk of granite or a piece of plate glass. Then I mount the blade in a Veritas Mk.II honing guide (the only guide I've found that can hold a thin, wide scraper blade without causing distortion). With the guide set to create a 45° bevel, I roll it back and forth until the bevel is formed. With the blade still in the jig, I hone the beveled edge on a 1,000-grit waterstone. Then I use a 6,000-grit stone to polish the edge. After honing the edge, I form the cutting burr using a burnisher.

Setup is easy—When setting up a scraper plane, the first thing to do is tilt the adjustable frog 15° forward. Then set the plane on a flat benchtop and insert the blade into the plane with its bevel facing toward the back. With the blade resting on the benchtop, clamp the blade in place by tensioning the thumbscrew. Next, to

TIPS FOR SETUP AND USE

Load and lock. *With the frog of the scraper plane set to a 15° angle (see illustration), and with the plane on a flat surface, slip the blade (bevel facing back) into the plane until the burred edge bottoms out on the flat surface. Then turn the locking nut to secure the blade.*

Set the depth of cut. *To set the depth of cut, pivot the frog forward 15°. When the blade begins to dull, pivot the frog farther forward to improve the cutting action.*

extend the blade slightly from the sole, move the frog forward slightly. This is done by backing the rear locking nut a quarter-turn off the post and tightening the front nut up against the post.

Test the cut on a flat piece of wood and make depth adjustments accordingly. If the blade isn't parallel to the sole, you will feel the plane turning sideways as it cuts. If this occurs, make lateral adjustments by tapping the side of the blade with a hammer.

A scraper plane works best when set for a light cut. That said, it should produce a nice, wide shaving, not dust. If your scraper is not cutting shavings, adjust the frog angle so that it is working in harmony with the burr you have created on the blade's edge.

To find the best angle, remove the blade from the plane and make a pass or two while holding it like a card scraper. Find the angle at which the blade best engages the stock, then adjust the scraper frog to that angle, reinstall the blade, advance it slightly, and take another test cut. After using the scraper plane for a while, the blade will dull and the cut will be lighter and less efficient. Tilt the frog forward a degree or so to reengage the blade.

Wood with uneven grain is an inevitable part of woodworking. Short of sanding forever, the next best option is to use a tool from the scraper family. You'll end up with a smoother board, in less time, with less dust. That's a rare win-win situation. □

Chris Gochnour builds furniture in Murray, Utah, and teaches woodworking around the country.

Skew the plane for easier cuts. *Like a cabinet scraper, a scraper plane cuts more easily when angled about 30° to the direction of travel.*

Scraper plane has the edge when doing edges. *When an edge requires scraping, the scraper plane has the best balance and control, so you're less likely to tip the scraper and create an out-of-square edge.*

CORE **TECHNIQUES**

Classic Half-Blind Dovetails

Cut perfect joints efficiently by hand

BY CARL SWENSSON

Sturdy and elegant. *The half-blind dovetail, executed in contrasting woods, is a handsome way to join drawer fronts and drawer sides.*

A tightly fitting half-blind dovetail is easy to find and easy to admire. Locating one can be as simple as opening the nearest drawer, because the technique most often is used to join drawer fronts to drawer sides. When made with contrasting woods, the hand-cut joint, with its narrow pins and variable spacing, is especially attractive.

Many a woodworker uses a router and jig to cut snug half-blind dovetails with relative ease. But the joint also can be cut efficiently by hand. In fact, with careful attention to sawing and chiseling techniques, I can cut a snug pair of half-blinds in about an hour. Here's how I do it.

Start with the tails

Cutting the tails first helps me to lay out the pins accurately and get a tight-fitting joint. The finished tails act as a template that is traced easily onto the pin board.

Start the layout with a marking gauge, using one setting to scribe the length of the tails on the end grain of the drawer front and on the drawer side.

Before continuing with the tail layout, reset the gauge to about 1⁄32 in. wider than the thickness of the drawer side. Scribe a line on the inside face of the drawer front, marking the length of the pins. The extra 1⁄32 in. lets the pins stand slightly proud of the assembled joint so that they can be planed flush.

I allow for this excess material in advance, because I will be cutting stock for

Photos: Steve Scott; drawings: Michael Gellatly

A perfect fit begins with accurate layout

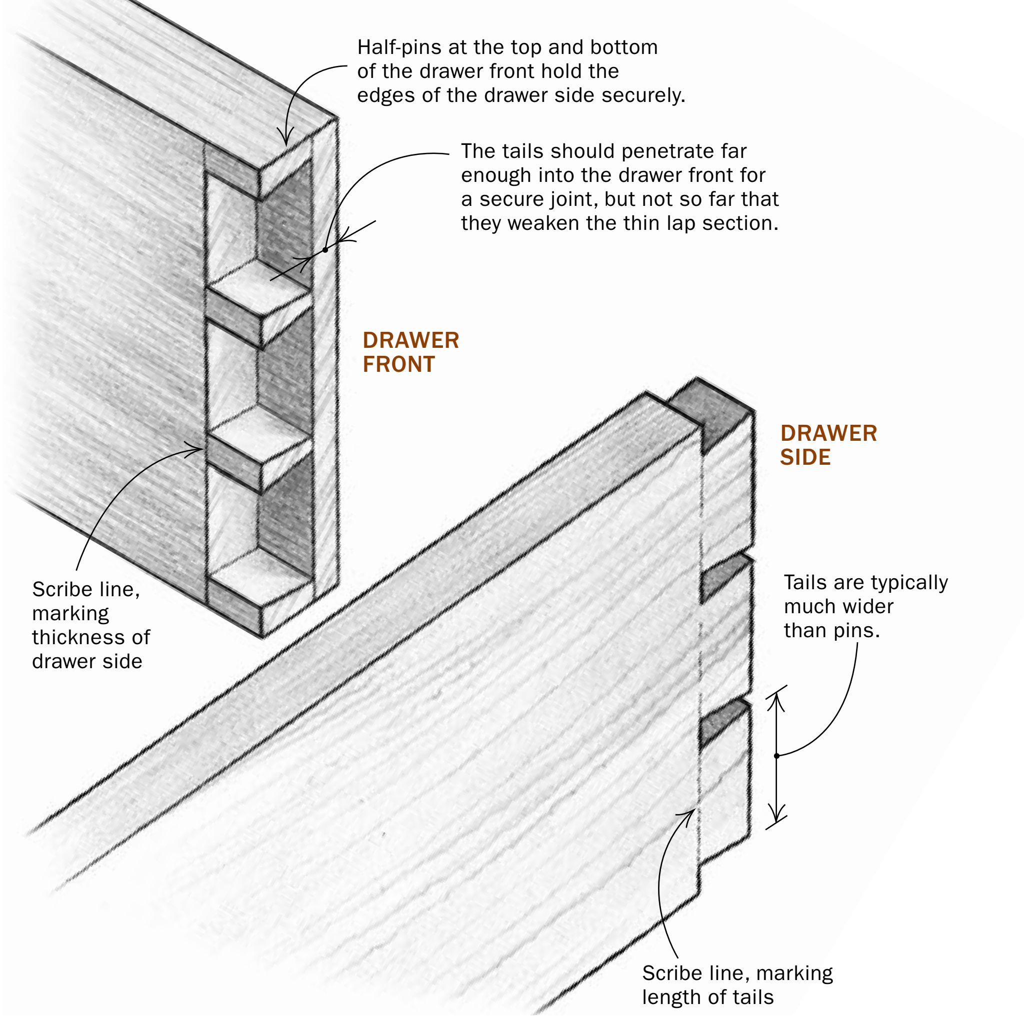
1

Determine the length of the tails. *In the end grain of the drawer front, scribe a baseline for the sockets that will house the tails. The tails should penetrate about two-thirds of the way into the drawer front for heavy-duty applications, four-fifths of the way for more delicate work.*

2

Mark the mating piece. *Use the same gauge setting to scribe a corresponding line on the drawer side, again marking the length of the tails.*

ANATOMY OF HALF-BLIND DOVETAILS



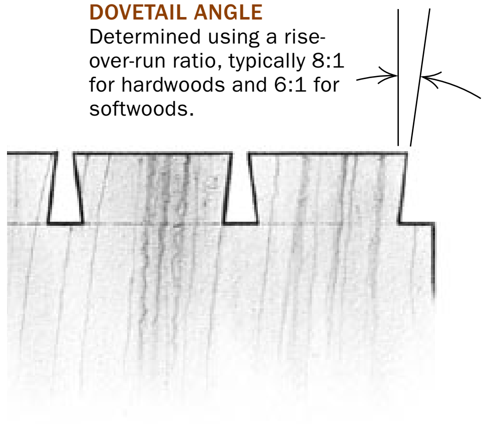
3

Set the socket depth. *On the inside face of the drawer front, scribe a line to match the thickness of the drawer side, plus 1⁄32 in. or so.*

4

DOVETAIL ANGLE

Determined using a rise-over-run ratio, typically 8:1 for hardwoods and 6:1 for softwoods.



Lay out the tails. *Set a bevel gauge to your dovetail angle and use a pencil to draw the angled lines on the drawer side. Use a square to carry the lines across the end grain.*

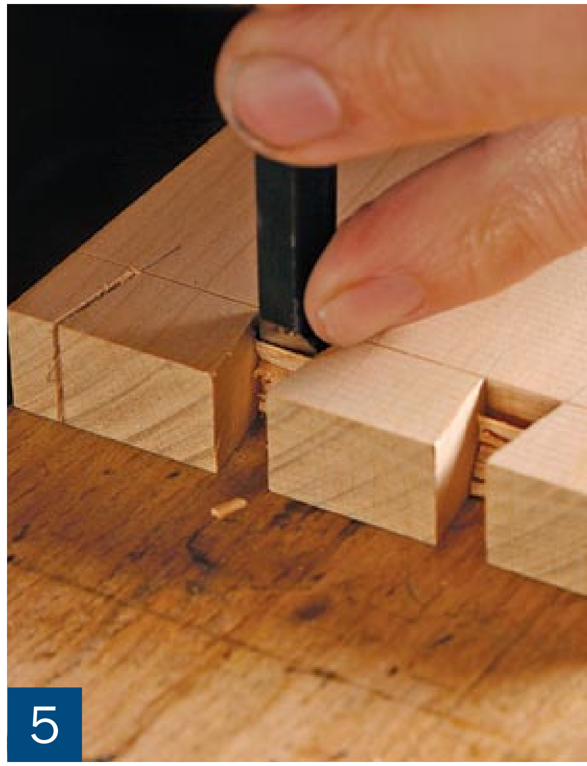
Cut the tails first

1 ***Start the saw at a low angle.*** *This helps establish the kerf over the full length of the cut. Swensson secures the drawer side flat on the benchtop with the end grain facing him.*

2 ***Steadily steepen the cut.*** *Alter the angle slightly with each stroke, bringing the blade vertical as you finish. When finished, you might be down on one knee.*

3 ***Start chopping out the waste.*** *Make a vertical cut about 1⁄32 in. on the waste side of the scribed line. If you start in the scribed line, the natural cutting action of the chisel will push it past the line.*

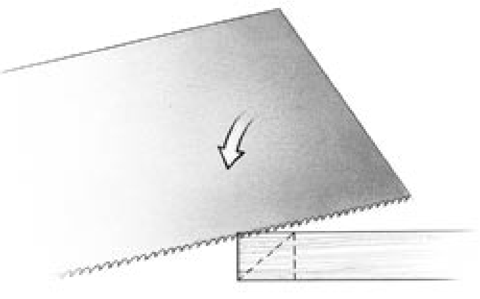
4 ***With the bevel down, cut a trough into the waste.*** *Continue to chop and pare until halfway through the waste. Then work from the other side.*



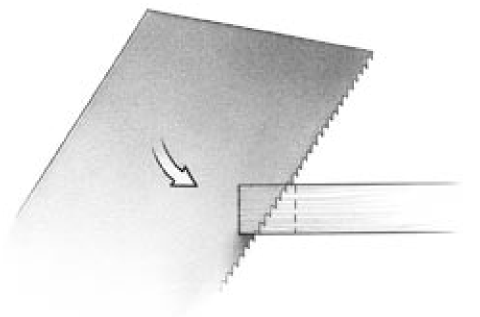
5 ***Pare to the layout line.*** *Afterward, use a small square to check that the sawn and chiseled surfaces are square to the face of the board. This helps ensure that the finished joint will go together tightly.*

SAWING TECHNIQUE

1. Start the cut at a very low angle to help establish the kerf. Steadily steepen to a 45° angle with the goal of reaching the bottom corner and the scribed line at the same time.



2. Steepen the angle to vertical as you finish the cut, taking care not to lift the saw out of the kerf or overcut the scribed line.



my drawer fronts to fit the drawer openings. Next, lay out the angled sides of the tails using a pencil and a bevel gauge. I like to set the angle at a 1:8 ratio, or about 7°. Slightly smaller or larger angles will work, but I find this one offers a good balance between visual effect and structural strength. Finally, use a square to continue the layout lines across the end grain.

For all of this work, keep your pencil extremely sharp. I sharpen mine to a chisel edge by pressing the point flat on a sanding block and working it vigorously back and forth. Others prefer marking with a knife for accuracy, but I've learned I can cut just as precisely to a pencil line, and I can see it much more easily.

Next, begin to saw the tail cheeks. My goal is to produce a finished surface directly from the saw. I use a Japanese ripsaw that cuts on the pull stroke. Its thin blade requires less cutting effort than a Western saw. Its long handle helps minimize steering errors, which are easier to correct because of the blade's flexibility.

I hold or clamp the work flat on a bench with the end grain toward me. In this way the stock is oriented properly for the ripsaw, letting the saw work in the direction of the long grain. The pull stroke also lets much of the sawdust fall to the floor, keeping the layout lines clear of debris. I hold the saw roughly midway along the handle. This hand position gives me greater control as I slowly start the cut. With the saw held at a very low angle, start with short, light strokes to split the line, using the small teeth nearest the handle for the greatest control.

If the saw jumps or lurches as you pull, it might mean that your angle is too high and the teeth are catching the corner. You also might be pushing down too hard, trying to cut too aggressively. The saw should slip into the wood.

Once the saw has broken the surface and opened a kerf, I progress gradually from the low angle to about 45°. This puts the saw as deep into the kerf as possible, providing more control and dampening the error from any offline strokes. I then move my grip to the base of the handle and begin to saw with the whole blade.

While sawing, I keep a loose grip on the saw handle. This lets my hand sense and immediately correct any vibration or binding of the saw in the kerf. A tight grip mutes these important sensations.

Accurate hand-sawing yields straight, clean surfaces exactly where you want them, but the skill takes time to develop. Beginners tend to be too careful and to saw too slowly. This results in a rough surface. To cut cleanly, the saw needs momentum through the cut; you would not run your tablesaw at half speed and expect a good result. Your saw stroke should exhibit the confidence of an expert with the open mind of a student.

As I cut, I watch the layout lines on both the face grain and end grain. My goal is to make steady progress toward the scribed depth of the tail and the opposite corner, and I aim to reach both at the same time.

It is an accepted practice at this point to flip the board and repeat the process, sawing this same triangular section and then finishing the cut to the final depth of the tail. This yields a predictably good result with perhaps a little cleanup with the chisel. A risky and more fun method is to keep the board in one position and continue sawing until you have reached the finished depth. I do this by keeping the front of the blade near the scribed depth and pivoting the handle end downward as I continue sawing. When the sawblade is vertical, I have reached finished depth on both sides of the board.

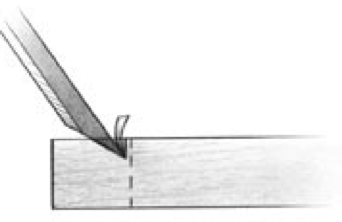
With practice, it's possible to use this technique without seeing where the saw is cutting. How the saw feels as it glides through the kerf tells one if the saw is going straight. If you do it right, the result is excellent. If you do it wrong, the reward is more practice.

Chop out the waste—After sawing all the tail cheeks, begin to remove the waste with a chisel. I choose the largest chisel that will fit in the joint without accidentally marring the sides. Placing the chisel about 1⁄32 in. on the waste side of the marked depth of the tail, make a series of firm vertical cuts, each followed by a bevel-down angled cut. The angled cut removes a chip and allows the next vertical cut to go deeper. Stop about halfway through.

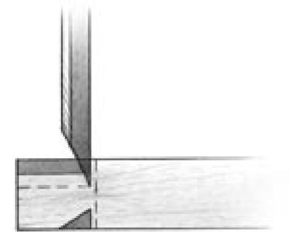
I never split off the waste on this side with a chisel cut on the end grain. The wood that remains will support the waste when working from the other side and will

CHISELING TECHNIQUE

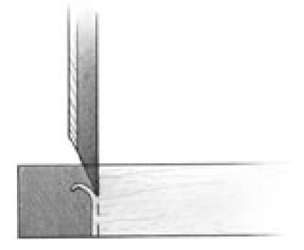
1. Start with a vertical cut on the waste side of the scribed line. Then cut out a V-shaped groove. Do not chip out the waste from the end of the board—yet.



2. Flip the board onto its other side. The remaining shelf of waste will serve as a support that prevents the end grain from tearing out as you chop from the other side.



3. Finish by paring the tails to the scribed line and to the saw lines, working inward from both sides.



Cut the pins in the drawer front

1 **Trace the tails to lay out the pins.** Place the drawer front vertically in a vise. Hold the drawer side firmly in place while tracing the outline of the tails on the end grain. Swensson uses a pencil sharpened to a chisel edge on a sanding block.

prevent an end-grain chunk of wood from being pulled out of the finished joint.

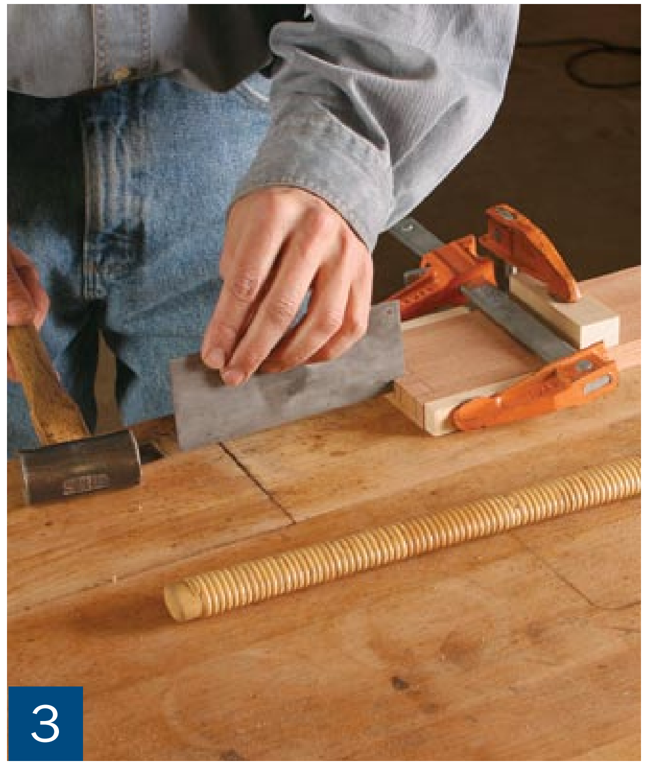
Flip the board and repeat the process. On this side it's OK to split off the waste from the end grain. With the waste gone, place the chisel in the cut from the marking gauge. Chisel the bottom of the joint square or with a slight undercut, working toward the middle from each side. The approximate $\frac{1}{32}$ in. of waste helps to control the edge of the chisel as it cuts. With good technique very little, if any, paring or fixing of the joint is needed. Think like a joiner, not a wood-carver.

Laying out the pins

Use the finished tails as a template to lay out the angled sides of the pins. I mount the drawer front in a vise, end grain up, and align the tails across it. Holding the drawer side firmly in place, I set my pencil tightly against the tails and trace their outline onto the drawer front.

As you begin to saw the cheeks of the pins, saw tightly to the waste side of the line. This gives the closest fit to the mating surface. I saw the pins with the same technique as the tails, except that the joint geometry does not allow me to saw through.

2 **Start the kerf with a saw.** Again, start at a shallow angle and steadily steepen the cut. Make sure that the saw arrives at both corners simultaneously.



3 **Finish it with a scraper.** Gently hammer a card scraper into the kerf. This extends the kerf into the corner that the saw can't reach. Make several passes with the scraper, starting near the top of the kerf and working down to the baseline.

4 **Clear the waste.** After chopping away the bulk of the waste, use a narrower chisel to gently clear material from the corners.

ASSEMBLY TIP

A chamfer eases the fit. Cut a narrow chamfer on the mating edges of the pins and tails. This protects the corners from crushing or tearing when fitting the joint.

Hammering the edges of a scraper into the kerf extends the kerf to the corner of the joint. I use a scraper as thick as or slightly thinner than the kerf. One end and one side are filed and honed flat and square to the face, as they would be prior to burnishing. (A knife edge might split the wood or stray outside the kerf.)

To remove the waste, place the chisel about halfway between the end of the board and the scribed layout mark on the inside face. I use as big a chisel and hammer as I dare and power the chisel vertically, stopping just short of the bottom of the joint. Most of the waste will break loose cleanly as I chop, leaving very little material to pare from the end grain. The cuts are actually well controlled by the wood, leaving a fairly clean surface. As before, clean up the end grain of the joint to the layout mark.

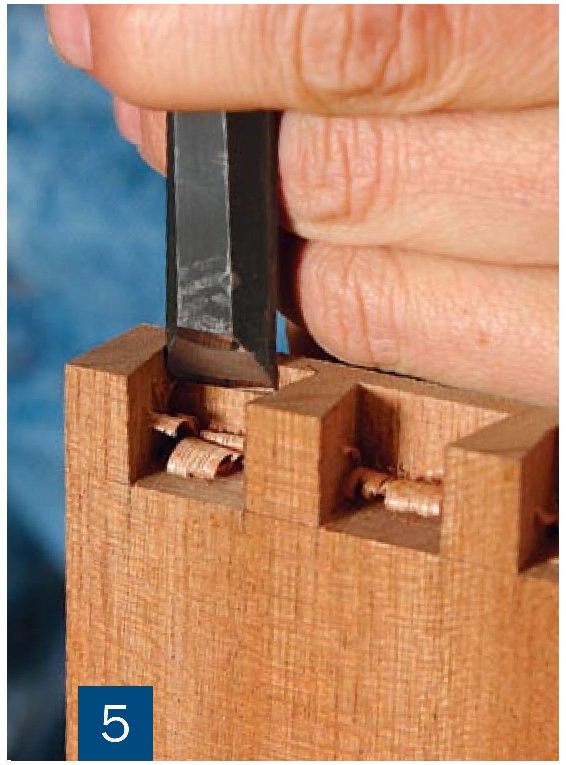
Bringing it all together

To prepare for assembly, cut a small low-angle chamfer on the inside edges of the tails and on the outside edges of the pins. The chamfers on the pins should be on the waste part that will be planed off at the end. These chamfers on the pins and tails will help the joint slide together, will distribute the glue, and will reduce the chances of blowing out the side grain of the tails.

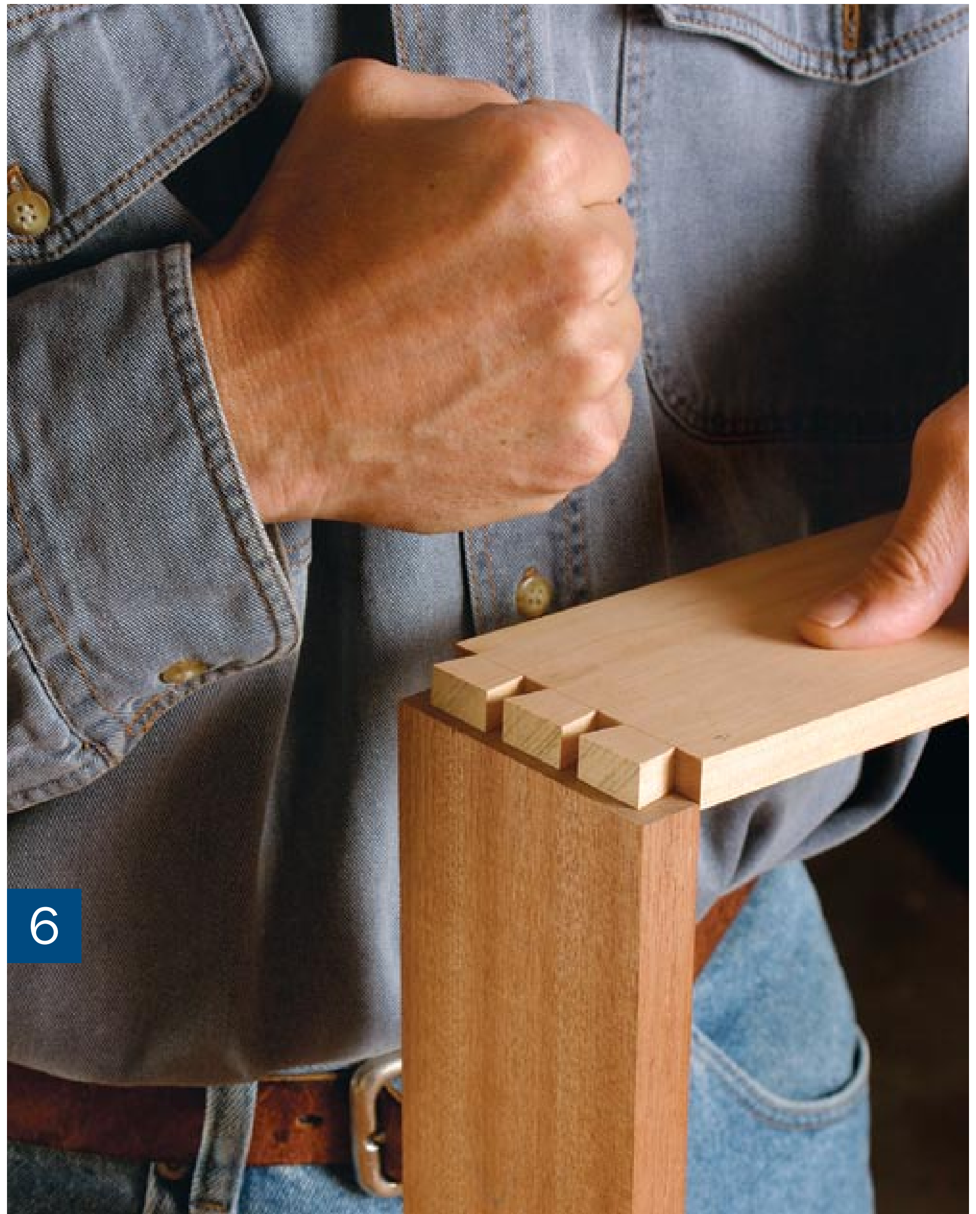
The joint can be hammered together, but pulling it up with clamps offers more control. I use a glue-up block that allows the pins to protrude. This glue-up block should be made of a softer wood than the drawer side so it will not compress the wood of the drawer side. A little shellac or wax will keep it from sticking to the drawer. A well-made joint will not have to stay clamped up while the glue sets. The fit of the joint will do the job. I do not recommend dry-fitting the dovetails, as each fitting loosens the joint.

If you sense that the joint is coming together too tightly, pull it apart and pare any high spots where the pins or tails are rubbing. Look for shiny areas where the friction of fitting has compressed the wood fibers. Also check any suspect areas with a small straightedge. □

Carl Swensson is a furniture maker and designer in Baltimore.



5 **Clean up and check the fit.** Pare to the layout lines (above), again checking the chiseled and sawn surfaces for square. A firm rap with the fist should be enough to get the joint started (right).



6

Through-Dovetails Made Easy

5 ways to increase accuracy and reduce the time it takes to execute this hand-cut joint

BY CHRISTIAN BECKSVOORT

Several years ago I contributed to an article, along with woodworking icon Tage Frid, that argued the merits of cutting pins or tails first. Frid preferred pins first; I'm a tails-first guy. But ultimately, as I tell my students, it matters little which part you cut first because once the joint goes together, no one can tell the difference. Over the years I've been building furniture, I've cut thousands of dovetail joints by hand, and during that time I've developed a number of tricks to make the job faster and easier. These are my five favorites.

Christian Becksvoort makes custom furniture at his shop in New Gloucester, Maine.

1 Cut two pieces at once

One of the reasons I think it's more efficient to cut the tails first is that you need to lay out the dovetails on only one piece, then use those marks to cut the tails on two pieces at the same time. And when you transfer those longer layout lines across the end grain of two workpieces and use the lines to sight your saw, you get a more accurate cut. Also, when you cut two pieces at the same time, such as two drawer sides, the resulting joints match visually. So whether you are cutting case parts or drawer sides, lay out the tails, clamp the two workpieces together, and save yourself some time.

Mark the layout on the face of only one piece. *Use a chisel to mark the cutouts where the pins will go, then use the same chisel to chop out the waste.*

Transfer the tail marks. *Use a pencil and a small square to lay out the tails across the ends of a pair of drawer sides.*

Make the tail cuts in both workpieces. *By cutting the tails in both pieces at the same time, it's actually easier to maintain the sawkerf at 90° to the face of the boards.*

2 Use alignment blocks when marking drawer parts

Spacers for alignment. *Becksvoort keeps a small box of spacers handy. He records the thickness on each one (to three decimal points), and finds one that fits snugly into the grooves for a drawer bottom.*

Have you ever dovetailed a drawer, glued it up, fitted it to the opening, and found that everything looked great until you slid the drawer bottom in place and discovered that the front and side grooves weren't aligned? I've done that, and learned from my mistake. Now I cut the bottom grooves first, using the tablesaw, before I lay out dovetails and cut and chop the tails on the side pieces. To transfer the tail cuts onto the drawer front, I use an alignment spacer made of a small block of hardwood (usually cherry). I keep a bunch of spacers on hand, about 1 in. wide by 2 in. long, machined to different thicknesses, and choose the one that fits best in the grooves I've just cut. The spacer should slide into the groove and stay put. I push it into the groove on the drawer front so that it projects about ¼ in., and then place the drawer side onto the spacer, which makes the bottom grooves align perfectly. I mark the dovetail pins with a slim knife, finish cutting all of the joints, and voilà, all of the drawer pieces align perfectly when the bottoms are slid into place.

The spacer registers the parts precisely. *By locking the sides to the front (above) and back (below) with the bottom spacer, pins will mate with the tail cuts perfectly. Becksvoort uses cherry for most of his spacer blocks because it's stable.*

3 Adjust the fit with graphite marks

If your dovetails are too loose, keep practicing; if they are too tight, no problem. If the knife marks are still there or there is a substantial amount of wood on the waste side of the knife mark, you'll have to remove the bulk of it first, just to get the joint to engage. Once the joint starts to engage, here is a trick that I've used for years to find the places that bind. I mark the bottoms of the tails with a pencil. Then I put the workpieces together and assemble the joint as far as it will go, pound it firmly with my fist, and then take it apart. The graphite will rub off on the tight spots on the pins, indicating exactly where I still need to remove some material. I carefully shave away the pencil marks with a chisel, shaving from the top if the grain is parallel to the length of the pin, or shaving from the inside or the outside if the grain runs in the other direction.

Mark the leading edge of all of the tails. *A soft (#2) pencil works best.*

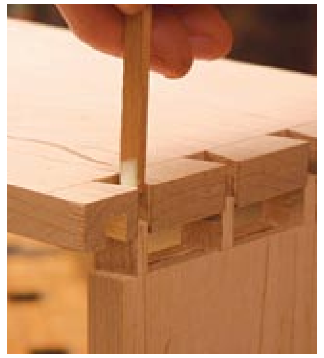
Test the fit. *Use your fist to engage the two workpieces, and then pull them back apart.*

Shave off the excess with a chisel. *The graphite left on the sides of the pins will tell you where you still need to remove material to get the joint to fit perfectly.*

4 Get corners started before adding glue

Glue sticks galore. *Becksvoort keeps a supply of small sticks on hand. Dipped in glue, the sticks make it possible to get adhesive into all the crevices of the dovetail joints.*

Gluing up a small drawer or box usually is not a problem. However, unless you have as many arms as an octopus, gluing up a blanket chest or even a large drawer can be intimidating. First of all, you can stack the odds in your favor by dry-fitting all four corners and getting your clamps and clamp pads ready. Also, remember that polyvinyl acetate (white) glue gives you a longer open assembly time than aliphatic resin (yellow) glue. I much prefer yellow glue, though, so I developed a strategy to reduce the stress of glue-ups. I partially assemble all four corners, engaging each only about ⅛ in. Then, using a square-ended glue-spreading stick (cut off the end of a popsicle stick, or make your own), I spread glue on all face-grain cheeks of both tails and pins—all four corners, all the way around the piece. Finally, I pound the corners home and clamp the parts together—done.



Photos: William Duckworth

5 Keep the clamp pads simple

Use pine for clamp pads. *Becksvoort prefers to use scraps of pine to protect the drawer cases from being damaged when clamping pressure is applied during glue-up.*

I once taught at a place where another instructor told students that they should make corner clamping cauls, or pads, with cutouts similar to finger joints that would fit around the ends of the pins that protrude slightly. He said you needed those spaces in the clamp pads to pull the dovetail joints together properly. I humbly disagree. I don't waste a lot of time on something that is not part of the finished piece—especially something that will be discarded when the clamping is done. Instead, for clamp pads I use a scrap of white pine the length of the joint and whatever thickness and width is handy. I find that the end grain of hardwood pins always digs into the softer pine, even the end grain of pine—it's no contest. So, unless you want to kill a lot of time, forget the tedium of making elaborate clamping cauls, and just use a strip of pine to clamp the dovetail joints together.

Apply pressure evenly from all sides. *Use spring clamps to hold the clamp pads in place, then use the bar clamps to pull the joints together. Indentations left in the pine clamp pads indicate that they did the job to bring the drawer pieces together tightly.*

The Secret to Perfect-Fitting Joints

Trim hidden areas to quickly produce a flawless fit

BY STUART LIPP

It is a common misconception that fitting a joint means methodically paring the entire area until all the surfaces match perfectly, but in many cases, wood needs to be removed only from hidden surfaces to allow a joint to close completely. I call this technique undercutting.

Do not mistake undercutting as taking the easy way out; undercutting is part of being a conscientious and concerned woodworker. The secret is knowing when to employ the technique. First, dry-fit a joint. Then decide if undercutting is the best option, or the entire joint needs trimming.

Undercutting can mean a few different things, but it usually involves angled relief cuts on surfaces that are not essential for glue strength. For example, when fitting a mortise and tenon, rather than planing the entire shoulder just chisel out the inner surfaces. By the way, if you undercut a joint and it still needs trimming at the edges, you have less material to remove.

I'll show you ways to apply undercutting to a wide variety of joints and situations. Over the past few years I have noticed myself employing this method more frequently, and in every situation the result is improved quality in far less time.

Stuart Lipp lives and works in New York City, where he oversees the construction of custom and limited-edition pianos at Steinway & Sons.

Gap-free table legs. *Undercutting is an efficient method for improving the fit of a mortise-and-tenon joint.*

TRIM SHOULDERS ON MORTISES AND TENONS

Undercut tenon shoulders. *Use a chisel to cut a slight downward bevel (no more than ¹⁄₃₂ in.) on the tenon shoulder.*

Carry the bevel around the shoulder. *Work your way around the perimeter of the tenon, leaving the outermost edge intact.*

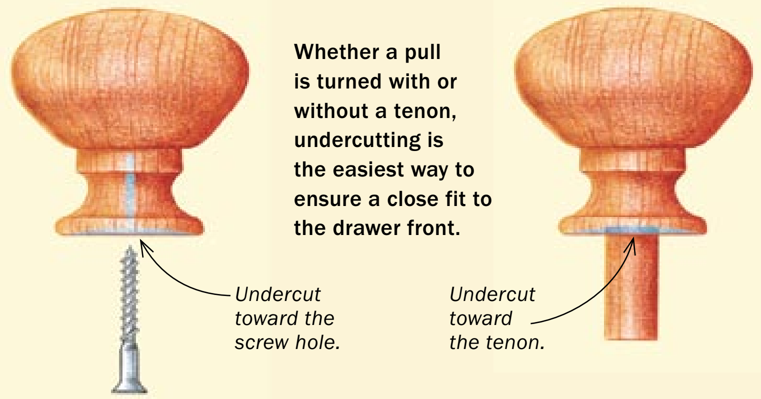
Mortise-and-tenon joints employ two forms of undercutting. The most well known is to make the depth of the mortise greater than the length of the tenon, giving excess glue a place to go and allowing the joint to close. But what if the tenon shoulder still does not fit well? You can spend a lot of time with a chisel or shoulder plane trying to pare a perfect 90° shoulder, or you can quickly undercut it.

Put the workpiece in a vise, tenon up, and use a chisel to pare the end grain in from the edge of the shoulder to the tenon. Remember to keep the outermost edge crisp. Undercut enough material for the shoulder to fit, but be careful not to take too much; a ¹⁄₃₂-in. bevel should be more than enough. Do this all the way around the shoulder and you will improve the fit of the joint. The technique is not magic—you still may need to pare the visible edges—but undercutting leaves less area to fit.

BACK-BEVEL DRAWER PULLS

Flush-mount. *Pulls should sit flush against a drawer front.*

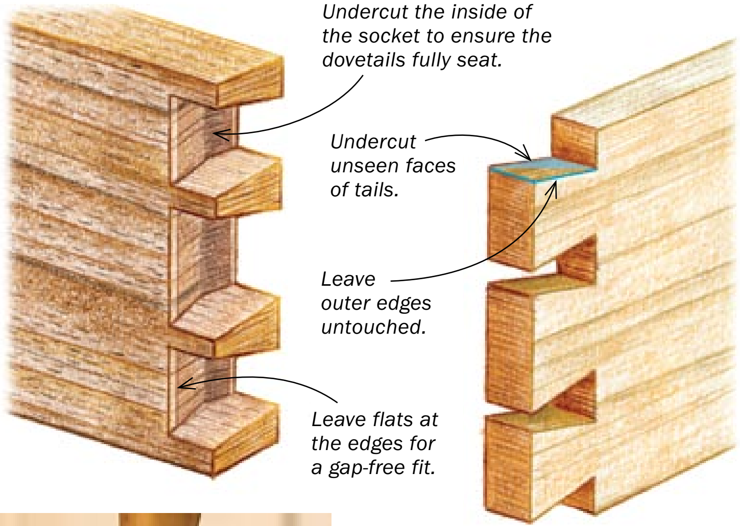
Turning your own drawer pulls can elevate the look of a piece of furniture, but not if the pulls don't fit tightly to the drawer front. A very quick and easy way to accomplish this is to turn a slight hollow in the back side of the shoulder, leaving the outer edge untouched. You will be ensured a nice, tight joint.



One-touch technique. *Use a skew chisel to undercut a pull while it is still on the lathe.*

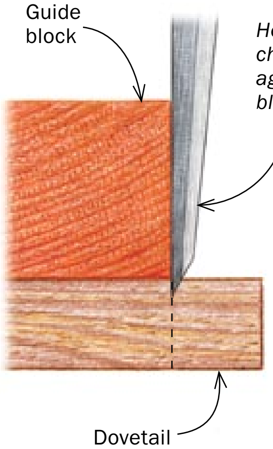
Good fit where it counts. *As long as the outer edges of the tails and pins are kept clean and tight, the dovetail is aesthetically correct.*

UNDERCUT DOVETAILS



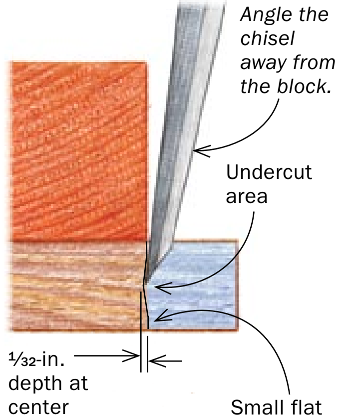
1 START WITH A VERTICAL CUT

Clamp a guide block to the baseline. Make the first chop with the chisel against the block to establish a flat at the edge.



2 ANGLE THE CHISEL SLIGHTLY TO UNDERCUT THE JOINT

Angle the chisel away from the block for subsequent chops. At the halfway point, flip the board and repeat on the other side.



Hand-cut dovetails can be a measure of a craftsman's skill; they also can frustrate and overwhelm. Undercutting dovetails allows for more precise joinery with much less fussing.

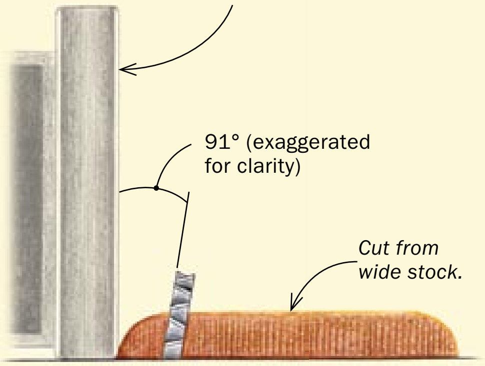
Not every face of a dovetail or pin is visible, so the most important edges are the outer ones. First, the bottoms of sockets can be undercut while simultaneously being chopped (see drawing). When doing your final fitting, you can always take a larger shaving from the bottom side of a dovetail. Doing this creates a slight wedge, and as you hit the joint home you will see it getting tighter and tighter. Don't worry about joint failure or lack of strength. The joint will have great contact, plenty of glue surface, and the inherent mechanical strength of the dovetail.

Focus on hidden sections. *The key to paring dovetails? If you won't see it, undercut it.*

Photos: Anissa Kapsales; drawings: John Tetreault

BEVEL MOLDINGS

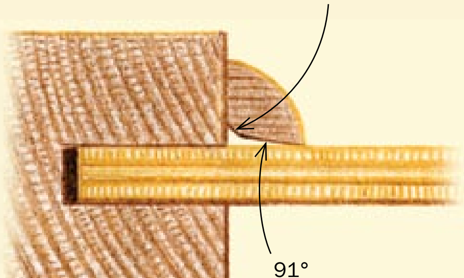
After the profile is cut, rip the molding to thickness with the blade set at 91°.



Easy-fit molding. *Cutting edges at 91° and chamfering the back corner allow for a flawless fit on molding details.*

I was making some cabinet doors recently that had flat panels and an added detail of quarter-round molding glued into the step between the panel and the frame. When I milled the molding, I cut the edges intended for the step at 91° instead of the standard 90°. This technique not only guaranteed a nice tight joint at the two visible edges, it also created a recess on the inside that trapped extra glue, thus reducing squeeze-out and minimizing cleanup. I also used a block plane to put a slight chamfer on the molding's inner corner for additional clearance.

Chamfering the molding's back edge creates additional clearance for a good fit and for hiding glue.



CHAMFER GLUE BLOCKS

Glue blocks are great for adding strength to joints. They can be used to support drawer or chest bottoms, to strengthen bracket feet and mitered joints, and to attach tabletops. However, if there is dried glue squeeze-out in a corner, you won't be able to press the glue block against both sides of the joint. Put a slight chamfer on the inner corner of the glue block, providing clearance for glue or debris.

No clamps needed. *A simple rub joint works to adhere glue blocks. Apply the glue and rub the block back and forth until it sticks where you want it.*

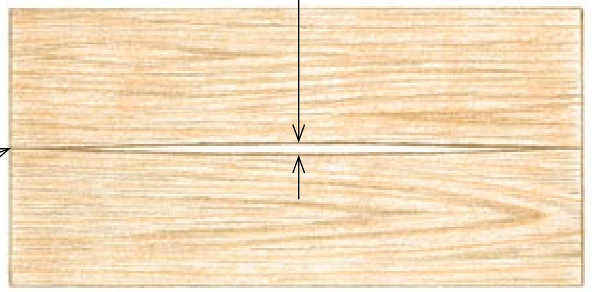
Create a chamfer. *Using a block plane is the easiest way to chamfer a glue block.*

Bombproof joint. *A nearly imperceptible gap, 1⁄32 in. at most, toward the center of an edge joint ensures a tight fit for decades.*

SPRING LONG EDGE JOINTS

The most common place for an edge joint to fail is at the ends. The rate of shrinkage is greater there than in the middle; this means more stress is put on the glue joint at the ends. A way to solve this is to undercut the center section, leaving a little extra wood at the ends to accommodate the shrinkage, so the tension that would usually be put on the glue joint is now absorbed by that extra material. Known as springing a joint, this technique also helps ensure that the ends of the boards stay tight during glue-up. You can spring any size joint, but unless it is over 18 in. long, the benefits are negligible.

To spring a joint, start with machine-jointed edges; that way you know you are dealing with straight, square surfaces. Next, put the boards horizontally in a vise, and break up the distance into five equally spaced sections. With a handplane, take three light passes: the first over the center section, the second over the middle three sections, and the last over the entire length of the boards. It is crucial that you get a complete shaving on the last pass because any snipe or chatter will compromise the fit of the joint. When you put the boards together with the ends touching, there should be a small gap in the middle, often almost invisible, never more than 1⁄32 in.

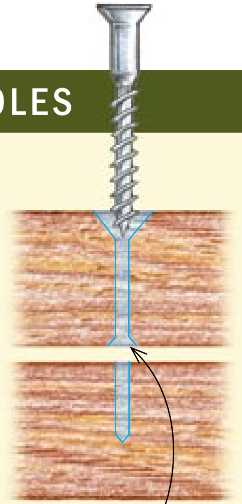


Lay out a visual guide. *Separate the boards into five equal sections. Plane the middle section, the middle three, and then the entire edge.*

Plane both mating edges at once. *This will help compensate for any misalignment in the planing angle.*

CHAMFER BACKS OF HOLES

When drilling clearance holes for screws, I find that even with a sharp bit I often get some type of tearout or fuzz on the exit hole. When screwing the piece down, there is a good chance that the little fibers of wood will prevent the joint from closing completely. The remedy is pretty simple: Just kiss each exit hole with a countersink. That removes the fibers and creates the slightest hollow, ensuring a tight fit.



Refine Your Designs with 3 Carvings

Easy to do with just a few tools, these ensure a handcrafted look

BY CHARLES SHACKLETON

DIAMOND BEADING

A trademark of my furniture is evidence of the hand-tool work that goes into each piece. It can be as subtle as the variations of a handplaned surface or as deliberate as hand-carved embellishments. These details catch the eye, add a pleasing effect to the overall design, and make each piece unique.

Diamond beading, curls, and rosettes are three carvings that occur frequently in my furniture, in numerous variations. Cutting these designs mechanically would require an expensive and complex tool, but carving them by hand is done easily—even if you're a novice carver—and requires only a modest investment in tools.

While you must work to the nearest 1/64 in. for a perfect dovetail or mortise-and-tenon joint, carving is your chance to cut loose from the bonds of the ruler and marking knife. You purposely are avoiding the perfect symmetry left by a machine. I hope these examples will encourage you to take up carving and add an extra dimension to your furniture.

CURLS

ROSETTES

A carved surface is all about texture

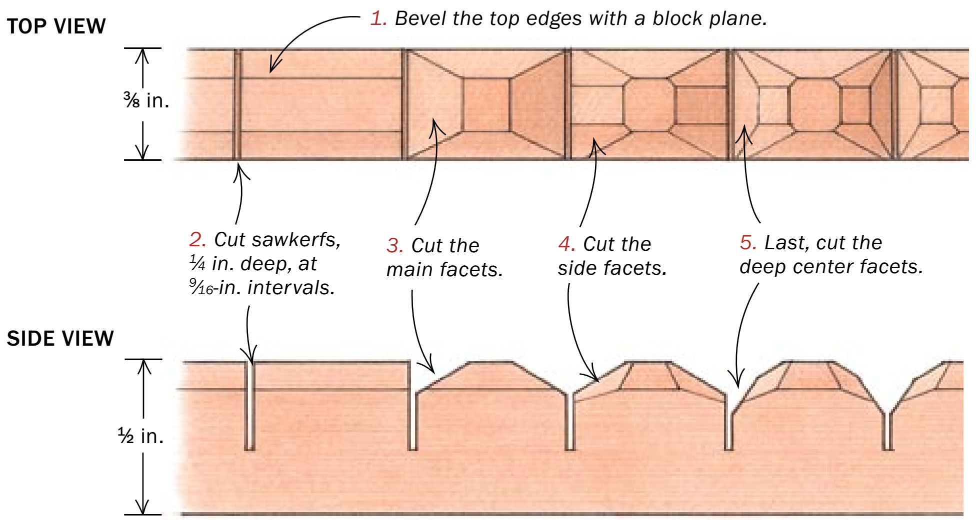
Many beginners try to achieve an almost flat surface, whether with multiple strokes of the carving tool or by sanding the wood. Everyone's taste varies in how textured a carved surface should be; I think you should aim for a surface with some inconsistency but not too much. I find that running my hands over the surface is a good way to locate rough areas that need another stroke of the tool. Above all, don't touch the carved wood with sandpaper after you put down your carving tools.

The author is the owner of Charles Shackleton Furniture in Bridgewater, Vt.

Photos: Mark Schofield

DIAMOND BEADING DRESSES UP MOLDINGS

A few simple tools—a block plane, a thin-kerf saw, and a ½-in. bench chisel—are all you need to form this diamond beading.



This decoration started out as a crude rendition of a berry molding. That design normally is a string of pure round beads, but my version came out in a faceted, hand-carved form. Creating this carving is an incredibly satisfying, soothing, easy, and quiet process, and it doesn't take that long. Diamond beading can add sparkle without overwhelming a design.

I use variations of the diamond, including one that looks like a row of four-sided pyramids (see photo, facing page). I think a furniture maker in my shop misinterpreted the original idea, or perhaps got bored, and this new version was born. That's how ideas come about: They evolve through mistakes, misinterpretations, experimentation, or just playing around.

Start with a piece of wood ½ in. thick by ⅜ in. wide, and slightly longer than you'll need, to allow for mitering. Bevel the two top edges with a block plane, but don't aim for perfect facets. Mark the length every 9/16 in. and cut down roughly ¼ in. with a thin-kerf saw.

With a ½-in. bench chisel, remove the wood in the order shown in the illustration. Some carvers perform the first cut along the whole piece before starting the second cut, for consistency's sake, but don't strive for perfectly matching beads.

Online Extra
To watch Shackleton carve this beading with only a handsaw, chisel, and block plane, go to **FineWoodworking.com/HTextras.**

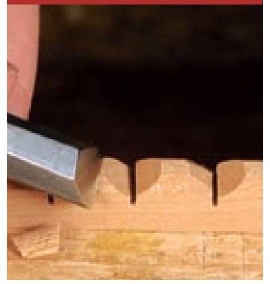
1. BEVEL THE TOP EDGES

2. DEFINE THE BEADS

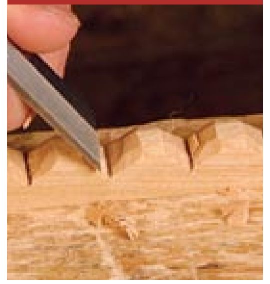
1. Use a block plane to bevel the top side of a strip of wood. Aim for a multifaceted arc rather than a smooth curve. 2. Then define each bead by making ¼-in.-deep cuts every 9/16 in., preferably with a thin-kerf saw.

3. CUT MAIN FACETS

4. CUT SIDE FACETS



5. CUT DEEP FACETS



3. Using a ½-in. bench chisel, start the first cut a little over a third of the way onto the top of the bead, angled at about 30° toward the sawkerf. 4. Cut the two side facets with the chisel angled to each side of the bead. 5. Lift the chisel to about 60° and cut the final facet about halfway down the first cut.

CURLS ADD DIMENSION

I originally came up with this design for the arm of an upholstered dining chair. It gave the chair a look similar to the ram's-horn curl on a Greek Ionic column. Even though this chair was nearly twice the price of one of my side chairs, it sold well. It was almost as if the carving let the customer know how much handwork had gone into each piece.

With carving in general, you can use the profile of a tool to design the carving rather than designing the carving and then buying tools to execute it. Once you have a rough sketch of the carving, walk the gouge along the line, tracing the path with a pencil. Then cut along the line with a knife, lay the template on the wood, and trace the line onto the wood.

First define the outline of the curl by driving the gouge straight down into the wood with a mallet. Chisel away the waste, working from the outside of the curl toward the center. When cutting across or against the grain, take lighter cuts to avoid going too deep. The center of the curl can be slightly hollowed to avoid leaving a flat spot on the carving.

Deepen the outline until you like the look. The depth should be roughly uniform over most of the curl but gradually taper until it disappears in the center. Where the curl joins the rest of the piece, try to have a slightly irregular transition from the smooth surface to the carved area. This will add to the pleasing hand-crafted appearance of the piece.

1. DESIGN WITH TOOLS IN MIND

2. DEFINE THE CURL

1. Use the sweep of a gouge you already own to draw the final shape of the curl. Then transfer the design to the workpiece by cutting around the curl with a knife and tracing the design with a pencil onto the wood. 2. Use a mallet to drive the gouge into the wood following the line of the curl. Don't try to cut down to the final depth at this stage.

Buy your carving tools as you need them

Resist the urge to buy an economical starter set of carving tools. You will end up hardly using some of them, while those you do use will cut poorly and never hold an edge. Instead, purchase top-of-the-line tools as you need them. I prefer the Pfeil brand (www.woodcarvingsupplies.com). The first number on the handle refers to the sweep, or curve, of the gouge, while the second number is the width of the tool in millimeters. Besides the sharpening stones you use with your bench chisels, you will need a leather strop and some honing compound. A few quick strokes on the strop will keep your tools cutting cleanly and effortlessly.

Maintain a sharp edge. *Hone the blade on a leather strop to maintain the perfect edge needed for effortless, clean carving.*

3. RELIEVE THE CUT

Work your way around the curl, driving the gouge in from close to the edge up to the previously cut outline.

4. RECESS THE CENTER

To avoid leaving a flat section of wood that will detract from the carving, slightly recess the center of the curl.

5. AIM FOR A TEXTURE

This one gouge carved the curl from start to finish. The sharp edges of the curl can be sanded slightly, but the scalloped pattern left by the gouge should not be touched.

Drawings: Vince Babak

ROSETTES ADD ELEGANCE

A lot of design originates from natural forms (evidence suggests that the Corinthian column evolved from the stem of the giant hogweed, or its Greek counterpart). Go for a hike and see what inspires you. There might be an idea hiding in a bush right outside your shop.

This rosette design may have originated as a dogwood flower or perhaps as a wild rose, but despite its intricate appearance, it is no more difficult to create than the previous two carvings.

This carving is deceptively simple because the majority of the profile is cut either on the lathe or using a cutterhead mounted in a drill press. The former method offers more flexibility in terms of design and size, but if you don't possess turning skills, the drill press can produce blanks very quickly.

Once the blank has been cut or turned, divide it into four quadrants by drawing curved lines from the midpoint to the edge. At the edge, remove four triangles of waste by pushing down on the gouge and at the same time angling it toward the rim. Then use the smaller of the two gouges to cut the curving line from the center to each triangle. Don't make the line too pronounced; an oil finish will enhance the line when penetrating the cut wood. Last, with a sharp scribe or the edge of a chisel, scratch in the vein running down the middle of each leaf.

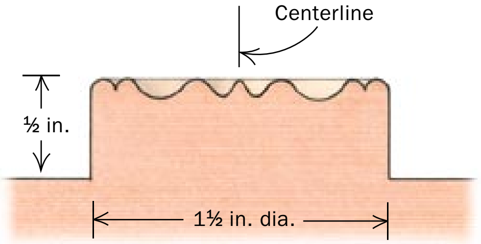
When mounted in shallow holes, the rosettes appear carved into the solid wood of the workpiece. I have used both large and small rosettes on the legs of coffee tables, as centers for drawer pulls on bedside tables, and to adorn kitchen dressers and mirror frames.

Highlighting a leg. *By inserting the rosette into a perfectly matched hole, it appears that the leg itself was carved.*

1. TURN ROSETTE BLANKS

Rosette blanks turned on a lathe have a limitless number of profile and size possibilities.

ROSETTE PROFILE



A drill-press option for cutting rosettes

If you don't own a lathe, mount a rosette cutter (www.mlcswoodworking.com) in a drill press. Use a fly cutter with the center bit removed to cut the outside of the rosette block, removing it from the blank.

2. MOUNT THE TURNINGS FOR CARVING

A carving's three dimensions are best illuminated with a bright light shining from one side. Here, Shackleton has prepared several blanks with double-faced tape on the lathe and mounted them on a piece of scrap board to ready them for carving.

3. DRAW IN THE FLOWER PETALS

Divide the face of the turning into four parts by drawing the curved outline of the petals.

4. CARVE THE PETAL CORNERS

Angle the gouge down and outward to cut away a small triangle of waste, which defines the corners of the petals.

5. DEFINE WHERE THE PETALS MEET

Push the curve of the gouge into the wood enough to show the edges of the petals.

6. ADD THE VEINS

Use the edge of a chisel to scribe the thin vein in the center of each petal.

6-Board Blanket Chest

Copying an original is an excellent way to use your hand-tool skills

B Y M I K E D U N B A R

This copy of a ca. 1800 blanket chest—also known as a six-board chest—is an ideal project for honing your woodworking skills. While the chest can be made by machine, its various parts are made equally well (and about as fast) by hand. It was fun to spend a few afternoons making something by hand. It reinforced for me how delightful the shop can be when the only noise is the whisk of sharp tools. I rediscovered how pleasant woodworking is without hearing, eye, and lung protection. When a storm knocked out the power one afternoon, I was able to keep working. It was delightful—just me, the wood, the tools, and the sunlight.

At first glance, the chest appears to be little more than a nailed box. As you make the project, you'll begin to respect simple joinery that requires mostly rabbets and dadoes. You'll begin to realize how much today's woodworking has developed construction into a design element. The original chest from which this one was copied has been in continuous use for nearly 200 years and is still solid and very much intact. Its survival is not unique. The chest seems to violate an important woodworking principle, in that the grain of the ends and sides is arranged in opposite directions. One would expect this to cause the front or back boards to split. However, that did not happen to the original example or to the untold numbers of other chests like it. Unlike glue, the nailing allows enough movement to compensate.

The original chest is generally referred to as a blanket chest, underscoring its purpose—to store folded items made of cloth. However, this was also a utilitarian piece of furniture usually kept in a bedroom against the wall or at the end of a bed. An average house would have several such chests.

The original piece's everyday function dictated a couple of construction choices for the cabinetmaker. Time-consuming joinery, like dovetails, was replaced with equally strong rabbeted joints. The original was made in New England, where white pine is still sold everywhere. Had the cabinetmaker been working in another region, he might have used yellow poplar. I used 5/4 clear white pine. The original box was made when a 1-in. board was a full inch thick. I felt the proportions of the original were important to the chest's overall appearance, which is why I chose 5/4 stock. The exception is the chest's bottom panel, which I made from ¾-in.-thick #2 pine.

Jointing stock, gluing panels

The original chest was made of six wide boards, excluding the three smaller pieces that make up the till, a small lidded compartment within the chest. Today, 18-in.-wide 5/4 pine is rare, so I bought 10-in. boards that could be glued up into six wide panels. Crosscut the stock 1 in. longer than the finished lengths of the panels so that when you glue them together, you won't have to worry about aligning the ends.

Like all hand-tool operations, cutting with a handsaw is easier when the wood is securely clamped to a bench. For me, it's easiest to follow my pencil line if, with each pull stroke of the saw, I raise the saw's teeth out of the kerf, away from the line, and then push them back into the line with each push stroke. This technique helps prevent the saw from wandering.

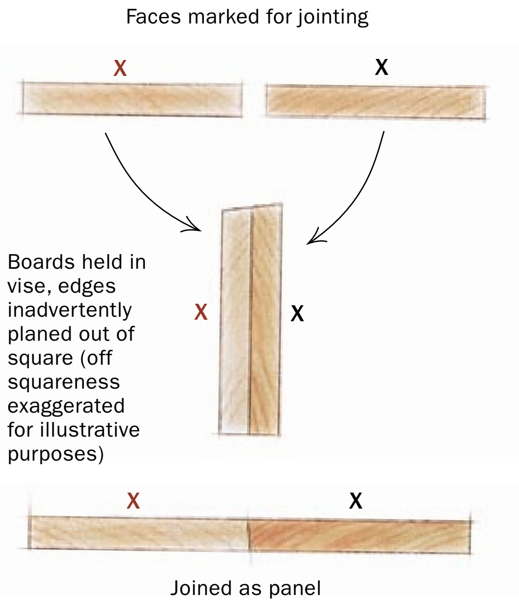
Determine and mark the good side of each board—the side you want to face out—and pair up the pieces into panels. Place the paired-up boards together and clamp them in a vise for jointing (see photos and drawings, right).

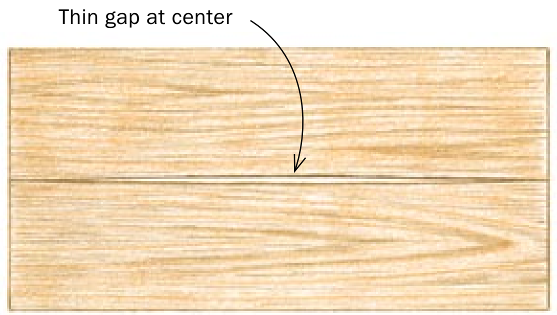
Use a jointer plane to make the edges straight, which may take a little practice. The key is weight transfer; as you start a cut, exert more hand pressure on the plane's front knob. As you push the plane along the length of the board, transfer pressure to your other hand and to the rear of the plane. The long, straight sole of a jointer plane will remove only the boards' high spots. The first several passes you take will probably result in less-than-full-length curls of wood. Once you are able to plane a few full-length curls, sight along the boards for straightness or check them with a long straightedge.

Once the boards are straight, take a final pass with your plane, beginning about 3 in. from the front end of the boards and ending about 3 in. from the far end. Called springing the joint, this reduces the amount of clamps you'll need to exert even pressure along the entire glue surface.

PERFECT JOINTS WITH A HANDPLANE

Boards that will be edge-glued into panels are aligned in a vise so that facing sides are clamped against opposite jaws. That way, any deviation from squareness in the planed edge will be neutralized when the boards are married into a panel.





***Spring a joint.** With both boards still in the vise, take a final pass that begins and ends several inches from the ends. When placed flat on a bench, the boards' edges will touch at each end and have a two-plane-shavings-wide gap in the middle (above). Now only two clamps are needed to pull the gap together and clamp the entire joint (right).*

Surface the panels and cut them square

Surface both sides of the panels to remove thickness-planer marks and to level the sides. As you plane, you'll find that what seemed like flat boards have lots of hollows. The panels are too long for a smooth plane. Its short sole will ride down into the hollows in the surface. I prefer a No. 6 jack plane, which is slightly longer and wider than a No. 5. For surface planing, use an iron with a slight crown honed into

Photos, except where noted: Jefferson Kolle

it. A crowned iron, as opposed to one with 90° corners between the cutting edge and sides, reduces the likelihood of planing sharp ridges into the surfaces of the panels. Instead, the surface will be very slightly scalloped, a sign of handplaned work.

One at a time, joint an edge of each panel. Use a framing square to lay out the ends prior to trimming. Lay out the finished

HANDSAW TIPS

Trimming an edge and staying square. *To avoid breaking a fragile edge, and thus making it difficult to restart a cut, hold the fingertips of your free hand lightly against the thin waste piece. To saw a square edge, stand directly above the cut so that you see the thin top edge of the saw, rather than either side of the blade.*

width at the same time. Measure corner to corner to be sure the panel will be square; if the diagonal measurements are the same, the panel has four 90° corners. Cut the panels to size using a ripsaw along the length and a crosscut saw on the ends. When ripping, the saw's teeth should just touch the outside of the pencil line. This way, when you joint the edge to remove the saw marks, the panel will not be undersize.

Because the rough length of the boards is very close to the finished length of the glued-up panels, you'll be left with a thin strip to trim off each one. In this situation, I use the fingertips of my free hand to push lightly against the strip to keep it from breaking (see photo, left).

Cut boot-jack ends and the stop joint

The graceful, curved feet of the blanket chest are referred to as boot-jack ends because their shapes are similar to a once-common device used to help pull off boots by jamming the heel into the V.

To cut these ends, first make a template half the width of the chest's side and draw a curve that pleases your eye. After tracing the pattern ends of the chest, cut out the pattern using a small bowsaw. The saw works best on the pull stroke. Use two hands and try to create a fluid motion that uses almost the entire length of the blade. Clean up the cuts using a spokeshave and a chisel, working from the center out on each side so as to cut with the grain.

Lay out the stop butt joint using a square and a marking gauge. Cut the return with a dovetail saw. Cut the length of the joint with a fine ripsaw. The surface needs to be smoothed with a block plane to remove saw marks. By skewing a block plane, you can start close to the stop. Straighten out the plane as you continue the cut. Clean into the stop using a chisel. Test the joint with a straightedge.

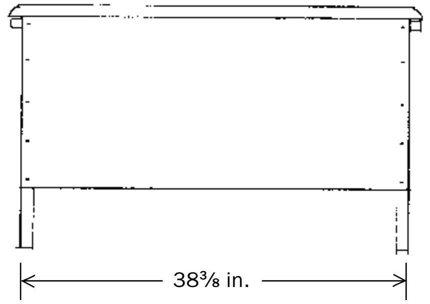
Cut the rabbets and dadoes

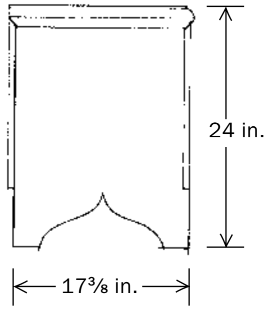
The front and back of the blanket chest have a rabbet cut across the grain. An iron rabbet plane has an adjustable fence that regulates the width of the cut. Set the plane to cut a rabbet 1⅛ in. wide—wider than the 1-in. width of the sides. The face edge will overhang the sides slightly and can be planed smooth after the chest has been nailed together. The plane's depth stop regulates the depth of cut; set it to cut a ½-in.-deep rabbet. The plane has a scribe (also called a nicker) under the depth stop. The scribe looks like a rounded cross with one corner missing. Each corner is sharpened and, when placed into the opening, projects below the sole. It is used when cutting cross-grain. The scribe severs the wood fibers ahead of the cutter, eliminating dreaded tearout.

To avoid blowing out the end of a crossgrain rabbet, clamp a strip of sacrificial

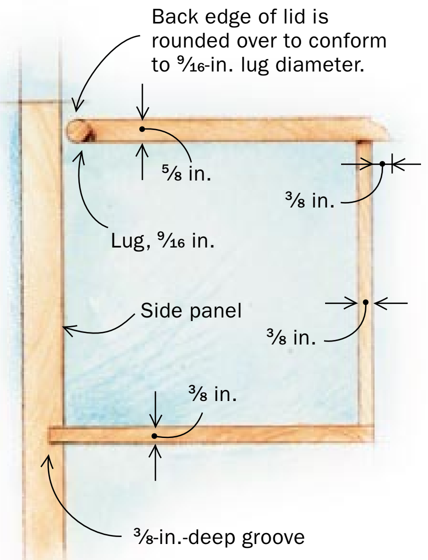
HANDMADE BLANKET CHEST

Chests like this were as common as candles in period homes, which were notoriously devoid of closets. The chest was usually placed at the foot of a bed and stored cloth goods. Local woods, available in wide boards, were used to make these chests. The boards were held together with rabbets, dadoes, and cut nails.

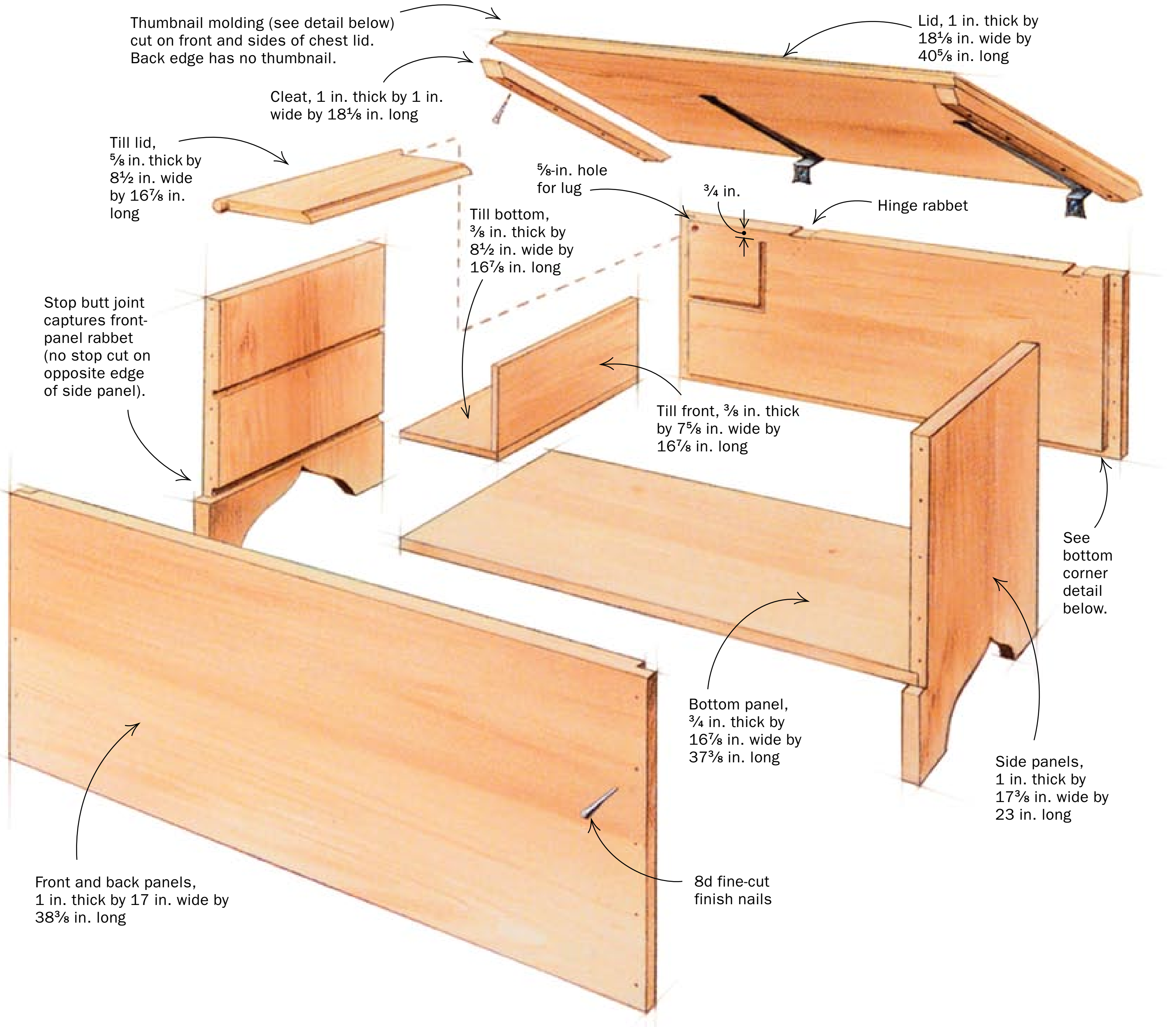




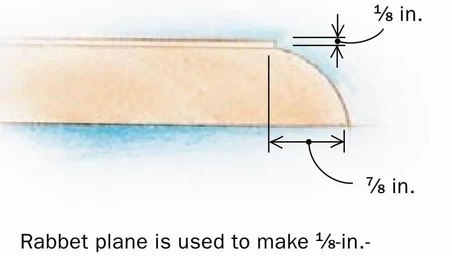
TILL CONSTRUCTION



Till front butts bottom. Thumbnail on till lid is smaller than thumbnail on chest lid.



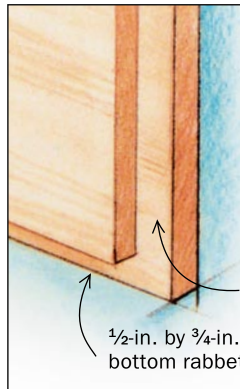
THUMBNAIL MOLDING ON CHEST LID



Rabbet plane is used to make ⅛-in.-deep cut, then edge is rounded over with block plane.

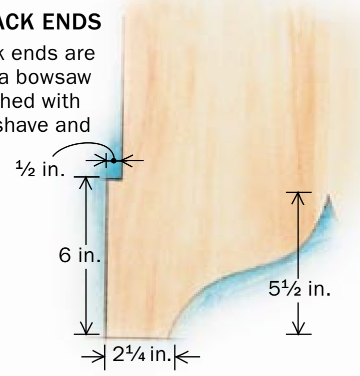
BOTTOM CORNERS OF FRONT AND BACK PANELS

Cross-grain rabbet is cut 1⅛ in. wide. After chest has been assembled, block plane is used to trim edge flush with sides.



BOOT-JACK ENDS

Boot-jack ends are cut with a bowsaw and finished with a spokeshave and chisel.



Drawings: Tim Langenderfer

MAKE THE SIDES

Bowsaw is as quick as a bandsaw. *A plywood pattern is used to trace the boot-jack end that forms the blanket chest's feet. If the bowsaw jams in the cut, just pop out the waste piece with a chisel blow to the end grain.*

Easy dadoes. *Scribe the edges with a knife, then clear the waste with a chisel. Repeat this process until the dado is ½ in. deep.*

Router plane is great option. *As you scribe the crossgrain edges, continue to deepen the dado with a sharp router plane. This tool will create a flatter, more precise bottom.*

wood to the far side of the board you're cutting. And when starting a cross-grain rabbet, draw the plane backward so that the scribe makes a preliminary cut. When you push the plane, be sure to keep it square with the surface and end of the panel. You need to apply as much pressure in and down with the hand supporting the plane as you do with the one pushing it.

As the rabbet nears completion, the depth stop will begin to ride on the panel's surface. Usually, it comes in contact first on the side nearest you, as it is a natural tendency to decrease the pressure on the plane as your arms become extended. Make sure the rabbet has a consistent depth, then test the fit of the side panel into the rabbet. Cut all of the cross-grain rabbets, then cut the rabbets along the bottom of the front and back pieces to accommodate the chest's bottom panel.

The bottom panel of the chest also fits into dadoes cut in the side panels. In soft white pine, you can cut a dado very easily using a utility knife and a chisel. Lay out the dado and clamp a straightedge along the mark. Score the line several times with a utility knife. Repeat on the other mark. With a chisel, pare the waste from the dado. When necessary, score the dado again and trim to depth.

Making the till

Like most early blanket chests, this one has a till in one end. The till was used for storing small items that would be hard to find if placed in the chest itself. The till fits into stop dadoes cut in the front and back panels and in a dado on one side panel.

Thin wood presents a problem when cutting with a handsaw. The saws used in general work are too large and frequently break the piece. I own a number of small handsaws that are cut with 14 teeth per inch for small work.

The till has its own lid that hinges on two wood pins called lugs, which are made by removing all but a short rounded tenon from the lid's end-grain ends. Lay out the lugs with a try square and trace a 9/16-in. circle on the end of each lug. Cut away the long strip of waste with a dovetail saw and a small handsaw. Clean up next to the lugs by paring away with a chisel. Undercut the waste on the corners of the square lugs, and then pare it away to round the lug. Test its fit into a 5/8-in. hole drilled in a piece of scrap.

Final assembly doesn't require glue

Use a square to lay out the dadoes for the till bottom and front, but do not cut them yet. First, test-assemble the chest. This not only allows you to check the fit of your joints but also to be sure that the stopped dadoes you've laid out will intersect. Run a clamp through the boot-jack ends to hold the bottom in place and the ends vertical. You can easily assemble the rest of the chest from this stage.

Disassemble and make any necessary adjustments. Cut the till dadoes the same way as those in the end pieces. Drill the 5/8-in. holes for the lugs in the locations shown.

When you're sure of the fit, reassemble the chest with the till parts in place and nail the rabbet joints. I used 8d fine-cut finish nails from Tremont Nail Co. (800-835-0121). These nails look the same as those on the original chest.

Because the nails are visible, their spacing is important; use five nails per joint. Drill a 3/16-in. pilot hole for each nail and run the long head with the grain.

Use a low-angle (12°) block plane to trim the rabbets' face edges flush with the chest ends. (Remember that you cut the rabbet joints wide on the front and back panels.)

Make and fit the lid

Cut the lid to size and make the cleats. Trace the beveled ends of the cleats with a bevel gauge set to the desired angle and cut them with a dovetail saw. Strike the bevels with a low-angle block plane to smooth away the saw marks.

To make the thumbnail molding, start with a rabbet plane to cut a 1/8-in.-deep rabbet on the lid's front and side edges. Again, it's a good idea to clamp a sacrificial waste block when planing end grain. Turn the rabbet into a thumbnail by using a block plane to round the square edge (see photo, above). Check to ensure that the profile is uniform along all edges. Attach the cleats using #10 by 1¼-in. screws.

The original chest had snipe hinges, which look like two cotter pins connected by their eyes. The leaves of the snipe hinges were drilled through the chest and clinched over into the wood. Some early blanket chests used butt hinges, while others used blacksmith-made offset strap hinges. Ball and Ball (800-257-3711) sells the handsome wrought-iron reproduction strap hinges I used.

The location of the till makes it necessary to mount the hinges off center, a common practice in the 18th century. □

Mike Dunbar teaches Windsor chair making in Hampton, N.H. (www.windsorinstitute.com).

SHAPE THE LID

Start the thumbnail with a rabbet plane; finish it with a block plane. *The lid of the blanket chest (and its till) has a thumbnail molding, a popular edge profile from the 18th century, on the two sides and the front. The thumbnail is made in two steps: First, cut a 1/8-in. rabbet, then round over the remaining square edge with a low-angle (12°) block plane.*

INSTALL THE HINGES

Strap hinges are simple. *They require only a shallow mortise in the edge of the back panel, and then they are attached with screws. Hold them firmly while scribing along their edges.*

Saw first. *After marking the edges, saw a shallow kerf to begin the mortise.*

Now pare. *Work from both directions with a wide chisel to clear away the waste and leave a flat bottom. Screw on the hinges.*

Photo, top left: Michael Pekovich

Colonial Cupboard

Practice 9 joints while building this simple cabinet

BY MIKE DUNBAR

This little cabinet is based on a late-18th-century original owned by a friend of mine. It's a rare piece, and antique dealers regularly pester him about selling it. The dealers want his cabinet for the same reason you will want to make it. There is always demand for an attractive and handy storage space.

The cabinet is interesting to woodworkers for two reasons. First, it's a tutorial on hand-cut joinery. Although a small piece, this cabinet requires nine types of joints. You will get some practice on dovetails, dadoes, rabbets, shiplaps, coping, miters, panel-in-groove, and mortises and tenons (both blind and through-). While some of the work would be more straightforward if it were done on machines, there is value in sharpening your hand-tool skills (and certainly less dust and noise). The choice is yours, of course.

Second, this cabinet is a chameleon. Its appearance can be changed in a host of ways. It's a good example of how a piece of furniture can be dressed up or down (see examples on p. 110).

Another plus is that you can drastically change this cabinet's dimensions to make it fit a particular space or application: My cabinet was designed to house my 8-year-old's videocassettes. You can even substitute a base molding for the bracket base and hang this cupboard on a wall.

Most of the stock is either ¾-in.-thick or ½-in.-thick pine. The cornice is 5/4 stock. I went to a local home center and bought #2 common boards, 1x8x12. There are so many small parts to the cupboard that I was able to work around most of the large knots or place them in shelves or back boards. The dime-sized knots that appear in the carcase and door give me just the look I had wanted—not too perfect but not knotty pine, either.

As you build the piece, remember to use reference marks to keep track of parts and their positions.

The carcase comes first

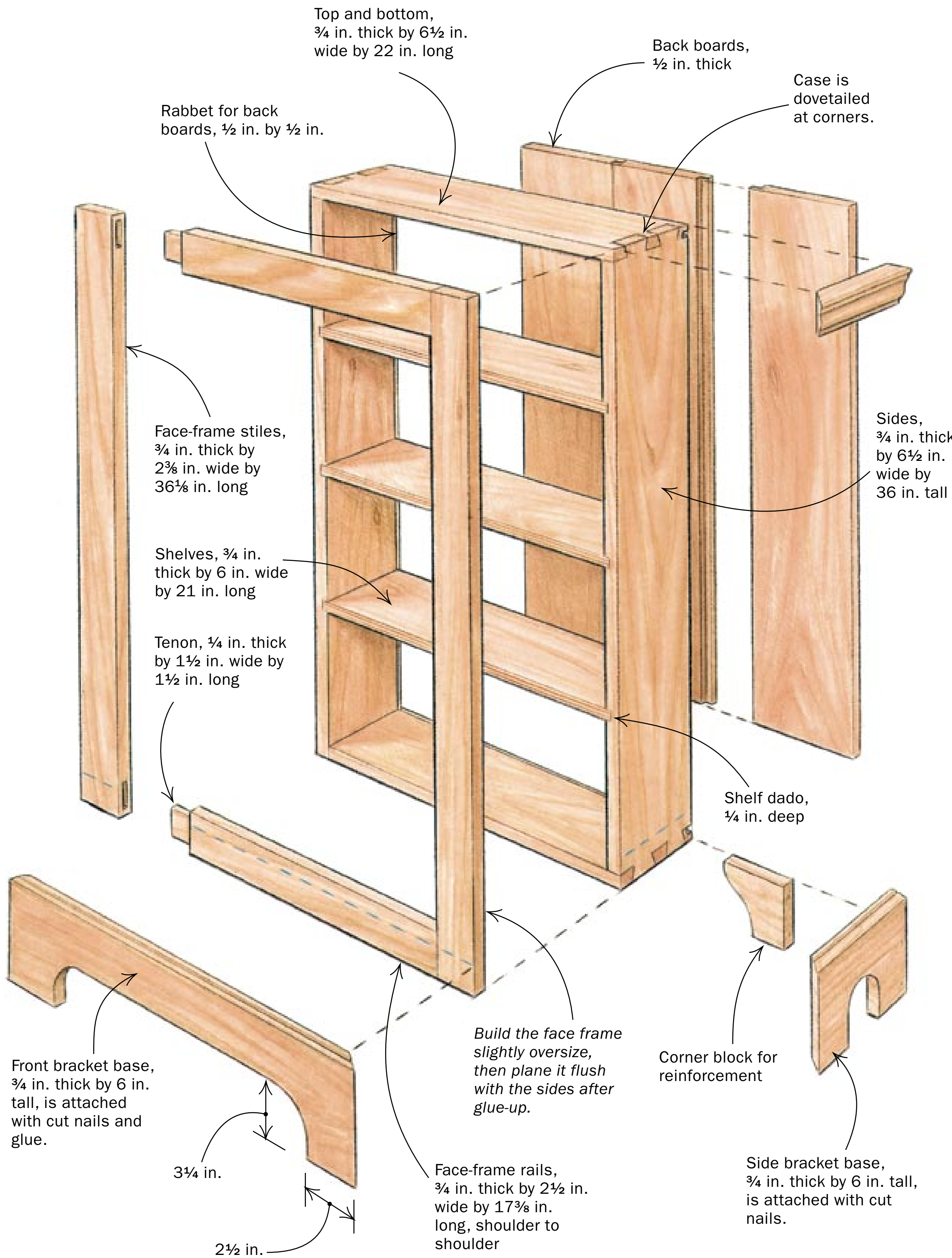
There are two large dovetails on each corner. Although it makes no real difference, my habit is to lay out the pins first. I sized the pins by eye, so each joint varies slightly. Because the dovetails are mostly covered by the cornice or the bracket base, uniformity does not matter.

Dry-assemble the dovetails to test their fit. Also, check the case for square by

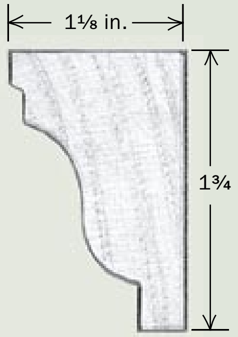
Photos, this page: Michael Pekovich; drawings: Bob La Pointe

A dovetailed box is the foundation

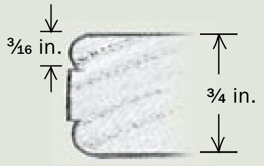
Shelves, back boards, face frame, cornice, and bracket base all attach to the dovetailed case. Then, all that's left is the frame-and-panel door.



CORNICE DETAIL

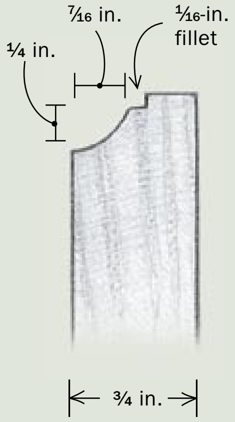


SHELF DETAIL



Bead the front edges of the shelves. *Dunbar uses a flat-head screw driven into a dowel to cut a small groove in each edge.*

BRACKET-BASE DETAIL



Quick dadoes with a utility knife and chisel

Matching dadoes. *Butt the sides against each other and lay out the locations of shelf dadoes (1). Use a utility knife to scribe the edges as deeply as possible (2), then pare out the waste with a chisel (3). Scribe and pare until you reach final depth. If you have one, use a router plane to clean up the bottom of the dado.*

measuring the diagonals from one corner to the opposite corner. If the measurements are the same, the case is square.

Rabbets and dadoes—Once the carcase has been dovetailed, rabbet the back to accept the back boards. Cut the rabbets with an adjustable rabbet plane (called a fillister), and clean them up with a shoulder plane. For a neater joint, check your progress with a small square. The four rabbets will leave small, square openings where they meet on the carcase, but these are visible only from the back.

Arrange the shelf placement to accommodate your cabinet's intended purpose. Lay out the dadoes on one side. Instead of measuring for the dadoes on the other side, match up the sides with their inside faces touching. Then transfer the layout marks from one side to the other. Direct layout techniques are always preferable to trusting a tape measure and your memory.

In the past, every woodworker owned a dado plane. But hardly anyone makes them any more, and the originals are expensive. You can use a multiplane like a Stanley No. 45 if you have one, but I find these all-in-one molding planes very difficult to use. You can make these dadoes with a simple utility knife and a chisel. Score straight lines along each edge of the dado, and pare out the waste between them. Score and pare until you are at the desired depth. You can speed things up by using a router plane (also called a widow's tooth) to regulate the depth of the dado.

Once the carcase is finished, glue it up and clamp it, again checking for square.

The face frame is next

The door is hung inside a face frame joined with blind mortises and tenons. You don't want to risk this frame being slightly smaller than the cabinet, so leave the stiles and rails a little wide: about 1/8 in. per side is enough. After the face frame has been applied, you can handplane its edges flush with the carcase. Also, leave the stiles 4 in. longer than necessary. This will result in "horns" on both ends that can be trimmed when you are fitting the face frame to the carcase. These horns make it less likely that you will split the mortises or break out their tops while chopping them.

Before laying out the joints, mark the front and outside edges as reference surfaces and number the corners. Use a marking or mortise gauge to lay out the mortises and tenons. For accuracy, use a single edge as a reference surface for the gauge's fence. Chop the mortises with a mortise chisel and cut the tenons with a backsaw. Fit each joint and then test-fit the entire frame. Check for square. If you are satisfied, glue and clamp it. Afterward, trim the horns with a backsaw.

In keeping with the period, I glued and nailed the face frame to the cabinet with 4d cut nails, leaving the heads flush with the surface. The rectangular heads of cut nails are attractive and also less obvious than round heads. I purchase my cut nails from the Tremont Nail Co. (800-835-0121; www.tremontnail.com).

Finally, plane the face frame flush with the carcase.

Shelves get a simple molding

The shelf fronts are molded, and if you wish to include this feature, choose stock that is knot-free along one edge. The molding profile—called an astragal—is a traditional way of decorating shelves. If you don't have a way of making this shape, you can run a small bead on each edge with a simple scratch stock.

Cut the shelves to length and fit them into their dadoes. There is no need to secure them with fasteners or glue because they will be held captive by the back boards and face frame.

The back boards are shiplapped, meaning the boards have two rabbets that overlap. Shiplapped boards allow for seasonal movement without gaps opening. Quick word of caution: If you are making this cabinet in the summer, you can fit the back boards tightly together; however, if you make the piece during the heating season, fit the back boards loosely, giving them room to expand.

Choose a cornice

You have two considerations when choosing a profile for the crown molding. The most important is that the cornice be in scale with the cabinet. The type of profile is less important; it depends on how accurate you wish to be to a particular period. The ogee is typical of the 18th century, but other shapes came into vogue during the 1790s and early 1800s.

I used an ogee molding plane to make the cornice. This would be a great time to tune up that antique molding plane you own and learn to use it.

When you run moldings by hand, it is important to use straight-grained stock. Also, it's much easier to mold a single piece of wood long enough for the front and two sides at once.

Today, we usually cut miters with a tablesaw or a miter saw. The hand method is to use a miter box and backsaw. The miter box is simple to make. But be careful not to cut the miters going the wrong way. Draw an angled line showing which way each cut has to go.

If you need to trim a miter to fit, a low-angle block plane is ideal. Hold the tool against your chest and pull the miter over the cutting edge. This method lets you cut precisely and only where you want to.

The cornice is also nailed to the cabinet with cut nails. Add glue between the mitered ends of the molding to stop them from opening up later. The top of the cabinet is visible, so use a handplane to level off the cornice and dovetails.

Bracket base

The upper edge of the bracket base is molded with a stepped cove. Furniture makers borrowed the cove from 18th-century architecture, but they added a small step at the top, called a fillet, to create another shadow line.

After cutting and testing the miters, make the scroll cuts along the bottom of each piece. I use either a small bowsaw or a

Nail on the face frame and back

Attach the face frame with glue and 4d cut nails. *These fasteners are appropriate to the period, and their thin, rectangular heads—aligned with the grain—are less obtrusive than round ones.*

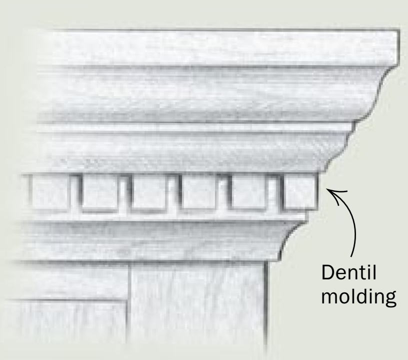
Shiplapped back boards. *The boards are rabbeted with the fillister to create the shiplap joints. When nailing on the boards, leave gaps between them to allow for seasonal movement.*

Photos, except where noted: Asa Christiana

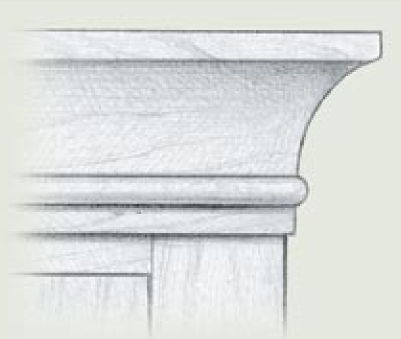
Crown molding

DETAILS MAKE THE DIFFERENCE

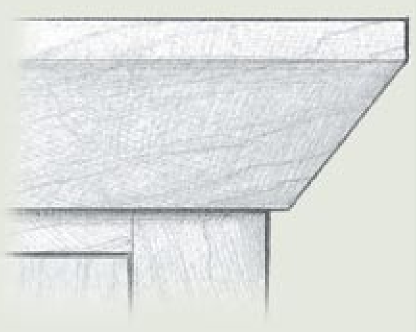
As built, this cabinet contains a fairly standard 18th-century vocabulary. By changing a few of these elements, you can shift the pedigree and overall appearance of the piece.



Make the cabinet more formal by building it of walnut or mahogany and adding complexity, including a dentil molding, to the cornice.

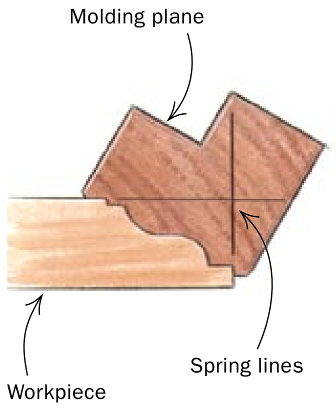


Bring the cabinet into the early 1800s by using a Federal-style molding for the cornice and a flat door panel with either an ovolo or an ogee on the stiles and rails. If you do so, use butt hinges and a later-style catch.

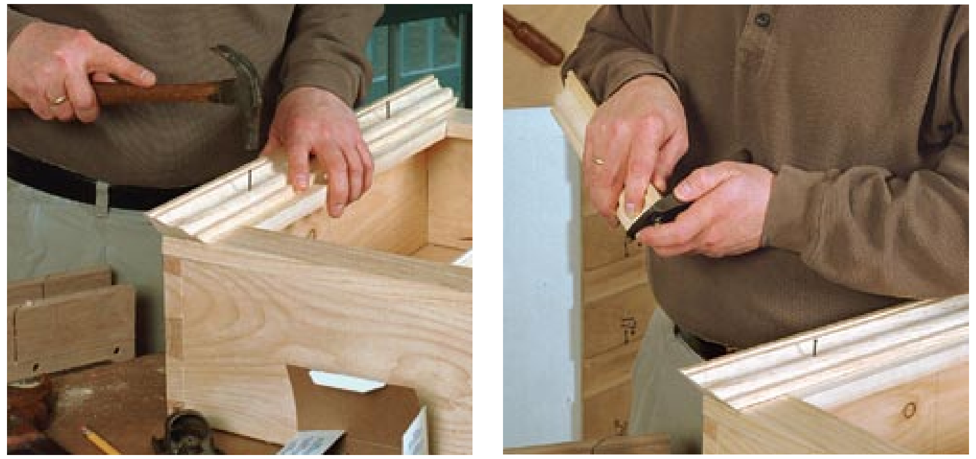


Create a country look by trading the moldings for simple bevels.

Mold the cornice with an ogee molding plane. *Take all three pieces of the cornice from the same stock. Cut the stock wider than necessary, to handle the cutting pressure.*



Many molding planes are designed to be tilted in use. Spring lines offer the user a visual reference for maintaining the proper angle while planing.



Fit the miters to each other. *Cut the front piece to size and tack it on temporarily. Then trim the miters on each side piece to fit the front piece. A good way to do this is to hold a block plane against your chest and drag the miter across it.*

coping saw. Here's a tip: It is easier to control a coping saw if you set it up to cut on the pull stroke.

Attach the base to the cabinet with cut nails. Then flip over the cabinet and glue in corner blocks, which will help strengthen the base.

Door offers many lessons

The raised-panel door is your next lesson in hand-tool joinery. Making a simple door with unmolded stiles and rails and a flat panel is a pretty straightforward operation. But add a couple of details, and the level of complexity increases by a surprising amount.

These stiles and rails have a typical 18th-century thumbnail molding, and the panel is raised, or "fielded." Begin by numbering the ends of the mating stiles and rails and then marking the reference edges. As with the face frame, it will be a disaster if your door is too small, so make the stiles and rails oversize. And once again leave the stiles 2 in. longer on each end to support the mortises.

Cut the through-mortises first—Eighteenth-century passage and entryway doors were typically through-joined, with the joints pinned and wedged rather than glued. These are very effective techniques for preventing sagging. When you lay out the mortises and tenons, you can use the same setting on the marking gauge that you used for the face frame. Again, use a single reference surface. Lay out the ends of the through-mortise, and with a square, continue the lines over one side and onto the other edge.

Chop the mortise only about halfway through. Then flip over the stile and finish the mortise from the other side. If you are careful to hold your chisels in line with the workpiece, both cuts should meet in the middle. Wait to cut the tenons.

Plow the grooves—In the 18th century, grooving was done with a plane called a plow. These were and still are made in wood, like mine. They were also made in cast iron. A plow plane features a depth stop and an adjustable fence to control the placement of the groove. Plow planes come with sets of cutters of graduated widths. Be sure to fence the plow against a corresponding face on each rail or stile; otherwise, the grooves may not line up at the corners.

Cut the tenons as you did for the face frame and test their fit. Leave the tenons short of the stile's full width by exactly the depth of the groove. They will not fit all the way through until the molded edge has been cut and coped.

Cut and cope the molding—I have a molding plane that makes a thumbnail. However, you also can use a rabbet plane to create the fillet and a block plane to round the profile. Use a small profile template to ensure consistent results.

The thumbnail moldings will not come together unless you cope them and cut away the mortise's front edge to the depth of the groove. Coping is a way to make moldings come together at an apparent miter without risking the miter opening with seasonal movement. Cope-and-stick router bits undercut the entire tenon shoulder. However, in hand work, it is only necessary to undercut one corner.

To cope the joint, you need a gouge close to the same radius as the thumbnail. If the gouge is ground along its inside curve, you can make a clean plunge cut. The thumbnail on the rails and stiles is ½ in., so measure back ½ in. from the shoulder along the molding to locate the top of the cope. The bottom will be at the intersection of the fillet and the shoulder. If your pine is at all crumbly, a straight plunge cut can crush some of the molding and leave a ragged miter. I avoid this by using a slight slicing motion toward the tenon (see "Coping the Corners" on p. 112). Assemble the joint. If your miter is ragged or uneven, you can clean up the coped edge with a sharp chisel. Cope the remaining joints and dry-fit the door. Check the diagonals to test for square.

Raise the panel—Cut your panel to size. Remember, this wide panel is intended to float in its frame, permitting seasonal movement. Place a rule in the groove in one stile and measure to the fillet of the opposite thumbnail. This is the maximum width of the panel. If you're building this piece in summer, make the panel about ⅛ in. narrower on each side. In the winter, I suggest making the panel ¼ in. narrower per side. The height only needs to be left

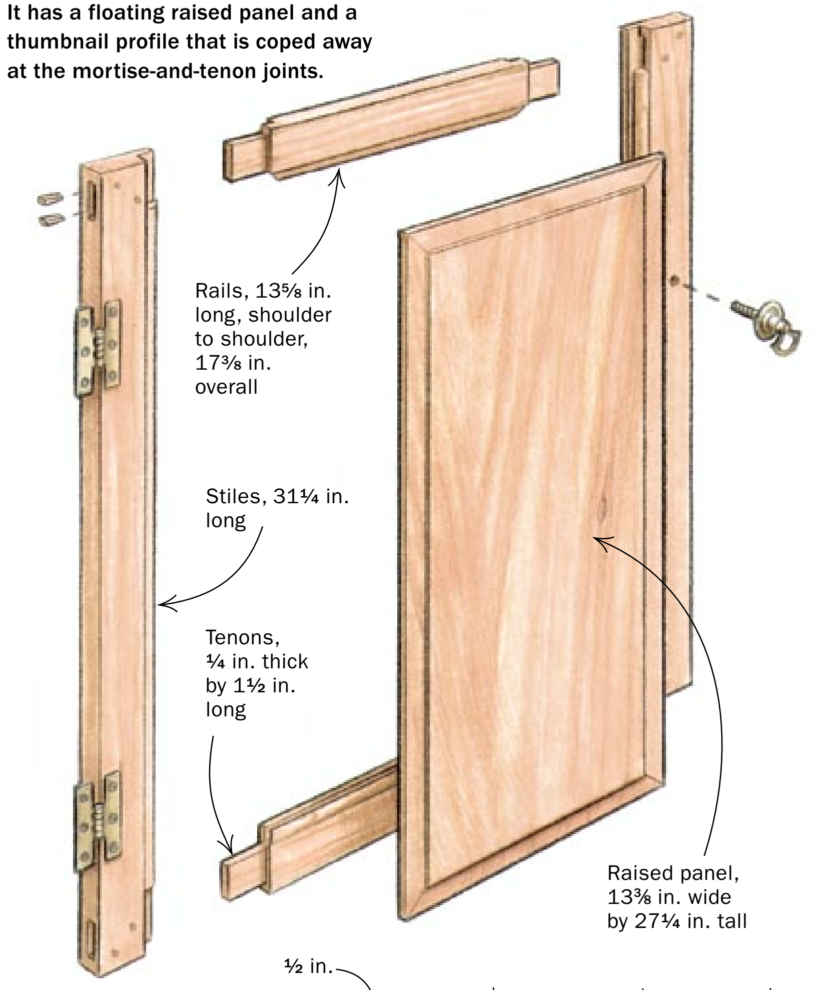
Build the bracket base

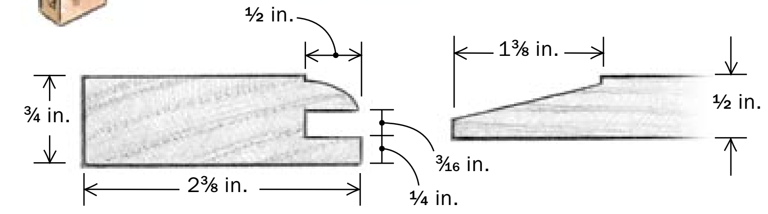
Make the scroll cuts in the bracket base. *Templates are used to lay out the simple cuts, and a coping saw makes short work of the job. The bracket base is molded, mitered, and attached in much the same way as the cornice.*

Send in reinforcements. *Corner blocks are nailed and glued on the back to strengthen the base.*

Frame-and-panel door

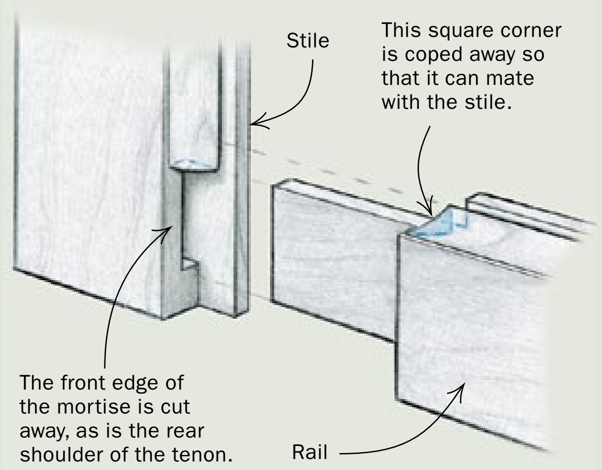
The door is the most challenging part: It has a floating raised panel and a thumbnail profile that is coped away at the mortise-and-tenon joints.





COPING THE CORNERS

Two edges of the mortise-and-tenon joint are relieved. Then a small amount of the thumbnail edge is coped so that the joint can close.



Plunge down with a gouge to cope the joint. *Pick a gouge that is close to the radius of the thumbnail and beveled along its inside, not outside, edge.*

Cut the thumbnail profile. *Cut the small fillet with a rabbeting plane, and then round over the thumbnail profile with a block plane, working to a line.*

Sight down the spring lines of a panel-raising plane to maintain the proper angle. *Cut the cross-grain sides first. Place a waste strip along the back edge to avoid tearout.*

After glue-up, the joints are pinned and wedged. *Drive the pins all the way through the door frame before cutting them flush. Then wedge the tenon ends to lock the joint.*

about ⅛ in. short at each end, regardless of the season.

It is difficult to raise a panel with a standard bench plane; a panel-raising plane makes the job much easier. Antique examples are expensive, but a number of modern makers still produce them (Harris, Crown Plane, Todd Hurley). I have four old models, and each raises a slightly different sized and shaped panel. A panel raiser is simply a big molding plane that cuts a raised-panel profile, so it is used the same way as a molding plane. It has a fence and a stop. Keep cutting until the stop comes in contact with the panel. A panel raiser has skewed cutters, which allow the tool to cut cleanly across end grain with a minimum of tearout. Still, choose straight-grained pine for the panel.

Plane the end grain first, holding the panel between dogs. Place a backer strip at the far corner to prevent break-off. Raising the sides is easier, because you are cutting with the grain. The trick here is to make each corner come out with a nearly perfect 45° angle. You can make this happen by trimming from one side or the other. You also can make small adjustments in the fit with a shoulder plane.

Place the panel in the frame, and pull the door together with clamps. The panel should not lift up any of the grooved edges. If it does, it is too tight and needs to be planed thinner. Do this by planing the back surface so as not to affect the front.

Assemble the door—Secure all of the joints. The mortises and tenons are pierced by two thin pins. Cut square lengths of pine and whittle them round with a wide, shallow gouge. The slight facets left help lock the pins in place.

The ends of the tenons are wedged at the top and bottom. Again, make squares and whittle the wedges with a gouge. Use a chisel to begin small splits in the tenon ends. Put a very small spot of glue on the wedges and tap them into place. Then saw and plane the wedges flush. These wedges close up the outside of the joint and are an attractive touch.

Trim the horns and plane the door to fit its opening. In the winter, remember to allow for the small amount of expansion that will occur across the stiles.

Two great finish options

I wanted my cabinet to look as if it had some age. The color I had in mind was the pale tan that raw pine turns to after about five years. However, I did not want to use a stain. Stains darken the softer latewood and leave the harder earlywood lighter in color, which is the opposite of the way pine darkens with age.

I achieved the look I wanted in one afternoon by using nothing more complicated than tea. I made a really strong mixture by steeping three bags in a cup of hot water. When it had cooled, I brushed the strong tea onto the wood, darkening the surface very slightly. I allowed this application to dry and sanded any raised grain. Each subsequent coat of tea darkened the pine further. It took four coats to give me the look I wanted. You can follow with varnish, or if you want to tweak the color slightly—to make it a bit less yellow, for example—use a topcoat of shellac tinted with aniline dye.

Milk paint is another attractive option, and is probably the finish this cabinet would have received in the 1700s. The Old Fashioned Milk Paint Co. (978-448-6336, www.milkpaint.com) is an excellent source for powdered mixes and provides good instructions for their use. A key is to finish the painted surface with linseed oil, which evens out the color.

Don't skimp on hardware

I hung the door with solid brass H-hinges, which are appropriate for an 18th-century design, and I secured the door with a brass pendant latch. Both of these items came from Ball and Ball Hardware Reproductions (800-257-3711; www.ballandball-us.com). While more expensive than the brass pieces sold at hardware stores and home centers, the prices were not prohibitive. I have always thought it a shame that a woodworker would invest so much in making a piece but then install cheap hardware. □

Mike Dunbar teaches Windsor chairmaking in Hampton, N.H. (www.thewindsorinstitute.com).

Q&A

A perfect burr on a curved scraper

Q: How do you tune a curved scraper without leaving flat spots?

—JEFF STEIFEL, Pittstown, N.J.

A: FIRST, FLATTEN THE OLD BURR on the edge by laying the scraper flat on a bench and flattening the edge with a burnisher. Then hold the scraper vertically by clamping it in a wooden hand screw and placing the hand screw in a bench vise. This allows you to file a long section of the curved edge without stopping. It's important to file the edge at 90°, but don't file straight across the edge as this will leave flat spots.

Next, hone the filed edge and the two faces to remove the ragged edges left by the file and remnants of the old burrs. To prevent honing facets on the curve, hold the scraper between two hands. Now, as you hone the edge, it will be easier to roll the scraper while keeping it perpendicular to the surface of the stone. Then hone the scraper's faces on the same 800- and 1,200-grit waterstones.

Once the honing is complete, return the scraper to the hand screw and bench vise. Use a burnisher to roll a burr along both corners. Finally, with the scraper flat on the bench, straighten the burrs by drawing the point of the burnisher along the inside of each burr to achieve the correct 30° cutting angle. (If your burnisher is not pointed, grind a 60° point on the end of it.)

—Philip C. Lowe is a frequent contributor.

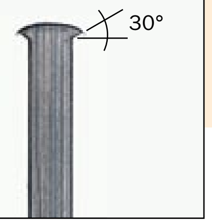
File without stopping. *With the scraper clamped vertically, file along the curved surface; longer strokes are less likely to file flat spots. (Note the starting and stopping positions above and left.)*

Hone on stone. *Again using long strokes, hone the scraper's curved edge at 90° over 800- and 1,200-grit waterstones, then hone the sides flat on the stones.*

Burnish a burr. *With the scraper clamped vertically again, burnish a burr along both corners of the curved edge. Then, with the scraper flat on the benchtop, use the point of the burnisher to adjust the angle of the burrs.*

BURR ANGLE

(Size exaggerated for clarity)



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Sharpening spokeshave blades

Q: I'm having trouble sharpening my spokeshave blades. The blade from my wooden shave is the wrong shape for my sharpening jig, and the blade from my metal shave is too short for it. Any advice?

—MIKE McDONALD, Belfast, Maine

A: THERE ARE SHARPENING METHODS for both types of blade despite their unusual sizes and shapes.

The drawknife-like blade of a wooden shave has two built-in sharpening aids, the tangs on its sides. Holding both of them, work the back of the blade on a stone. A perfectly flat back isn't critical; in fact, a very small back bevel strengthens the edge and gives a little added control coming out of a cut.

The exact bevel angle isn't critical either (around 20° is fine), but it should be a consistent angle. To achieve this, rest the blade in a shallow "V" groove in a scrap block. Hold one tang, and slide a sharpening stone across the bevel.

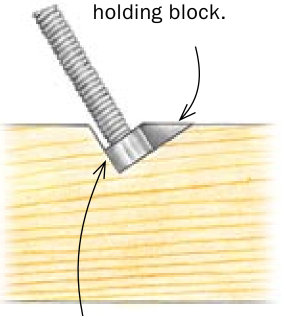
The short blade of a high-angle, cast-iron spokeshave is sharpened as you would any plane blade—at a 25° bevel, with a flat back. Put a slight curve on the edge if you want to use the shave for smoothing.

To use a sharpening jig, tape the blade to the end of a standard plane iron—or to a ¼-in.-thick scrap of wood that's the same size as one. The idea is to "lengthen" the blade so it fits in the jig. Then you can sharpen it as you would a plane iron.

—Garrett Hack is a contributing editor.

WOOD-BODIED SPOKESHAVE

***Start with a back rub.** Holding both tangs, rub the back of the low-angle spokeshave blade on a sharpening stone.*



***End with help from a holding block.** Fit the blade into a V-groove in a wooden block, and run a sharpening stone over the beveled edge to complete the job.*

METAL-BODIED SPOKESHAVE

***Tape two blocks together.** To sharpen the blade of an all-metal spokeshave, begin by taping it just ahead of the front edge of a plane blade, with the bevel facing outward. Place the "elongated" blade into a sharpening jig and work it over a stone as you would a standard plane blade.*

Photos and drawings: staff

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Wax keeps rust off hand tools

Q: What should I use to keep hand tools from rusting? I've seen suggestions ranging from paste wax to WD-40 to camellia oil. Do any of those substances work better than good old 40-weight motor oil?

—JERRY MALONE, Pueblo, Colo.

A: IN MY EXPERIENCE, light rust on hand tools means that the shop is too humid. If you can, keep the shop heated and cooled; at a minimum, run a dehumidifier during the summer.

If climate control isn't practical, coat the metal surfaces of hand tools with a substance that keeps rust away. Paste wax will work. Just buff it to remove the excess, and reapply regularly because it wears away. You also can store tools in a canvas tool bag in a room with reasonable humidity levels. But I wouldn't use camellia oil or motor oil. They stain the wood, and I don't like the oily feel when I use the tool.

—Lonnie Bird runs a woodworking school (www.lonniebird.com) in Dandridge, Tenn.

Corrosion prevention. *A light coat of paste wax can help prevent tools from rusting. If you apply the wax with 0000 steel wool, you can remove light rust from the tool at the same time.*

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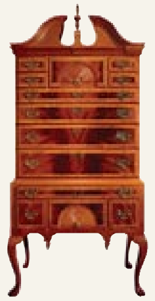

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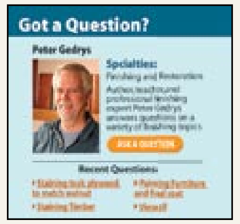

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